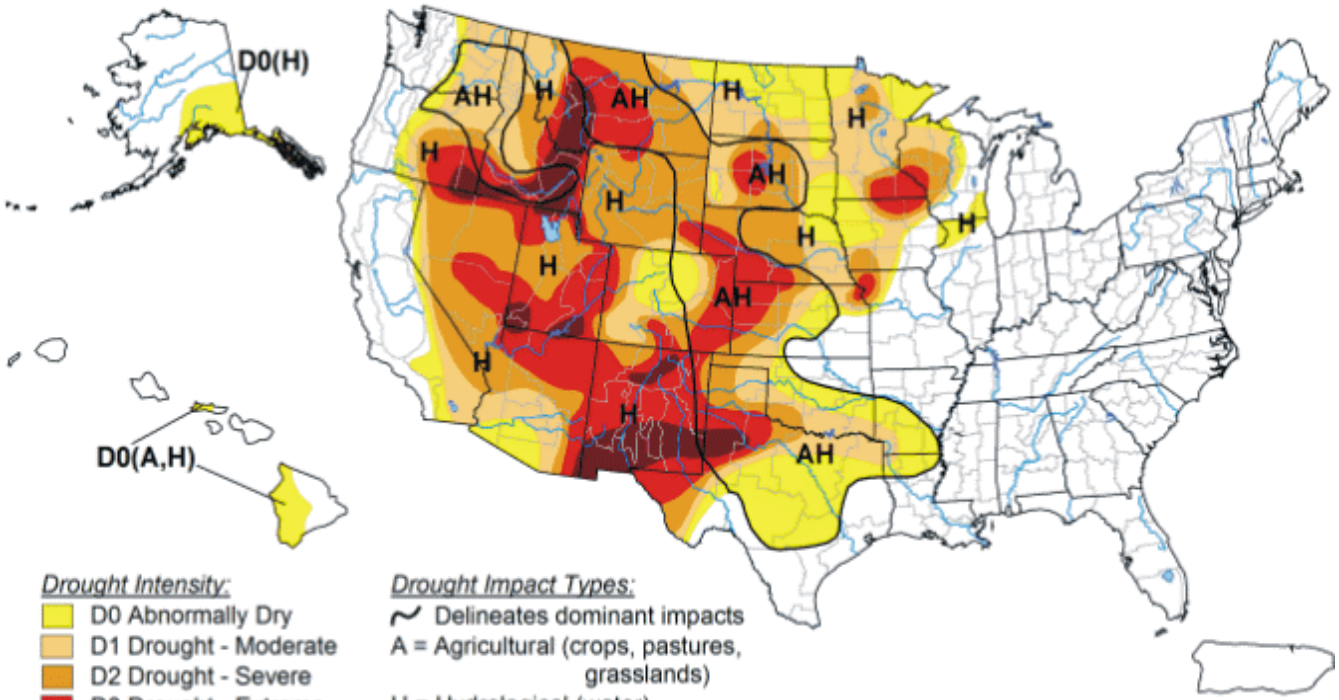
DNR Drought Assessment Committee Meeting January Presentation Jan. 13, 2004

Missouri Department of Natural Resources

U.S. Drought Monitor

January 6, 2004
Valid 7 a.m. EST



Drought Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:
- ~ Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

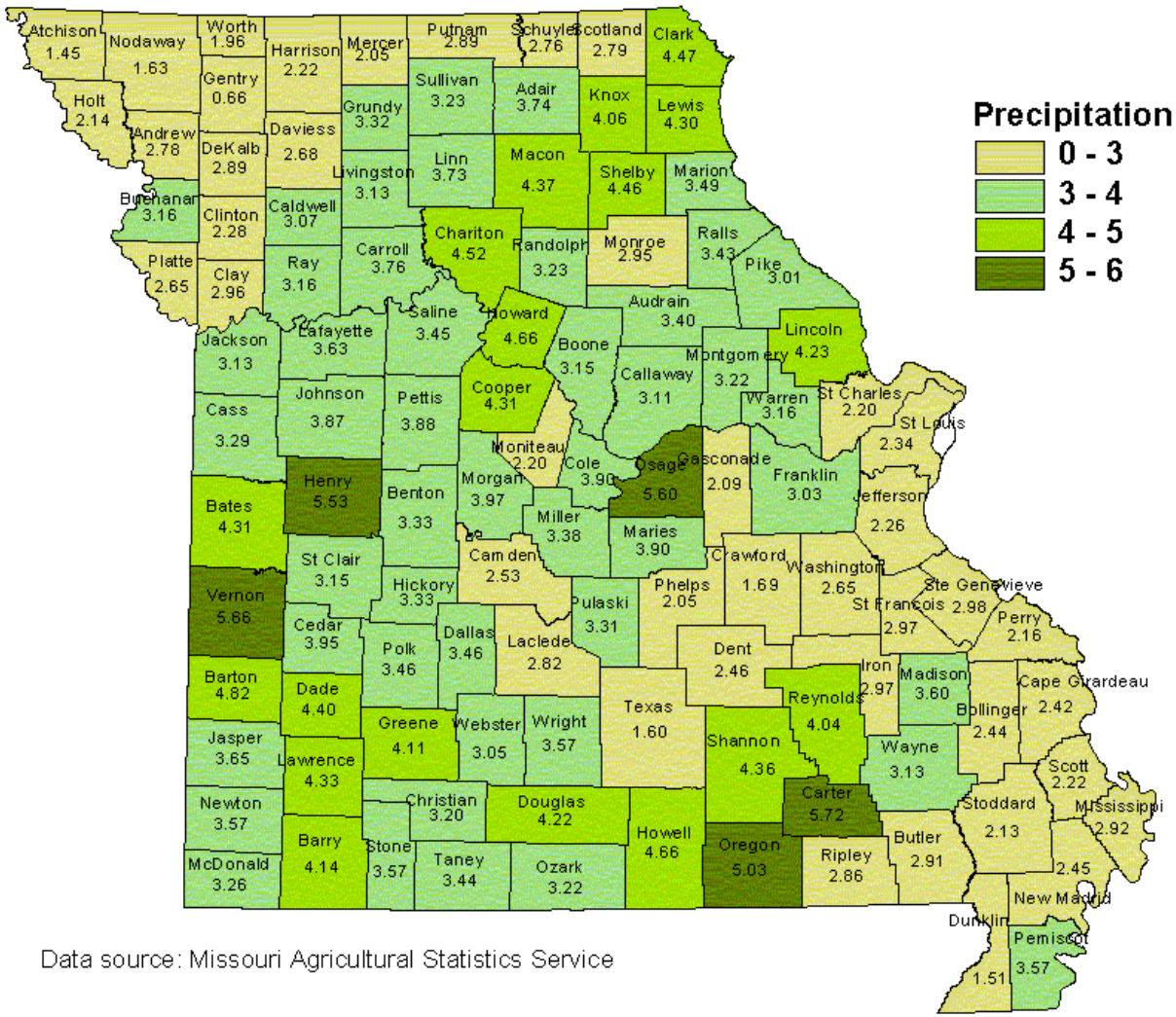
http://drought.unl.edu/dm

USDA National Drought Mitigation Center

Released Wednesday, January 8, 2004

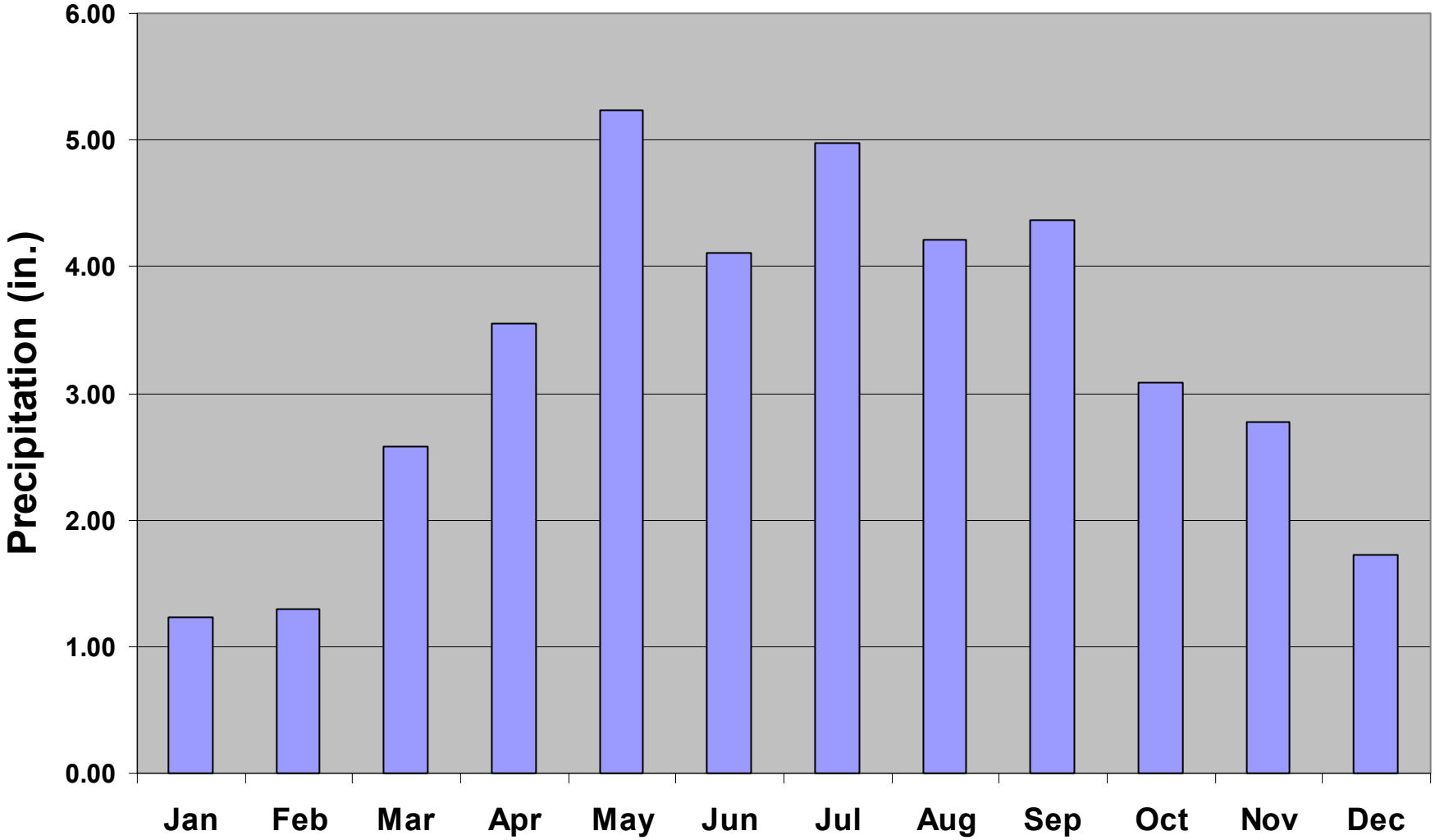
Author: Rich Tinker, NOAA/NWS/NCEP/CPC

Monthly Precipitation by County (Dec. 2003)



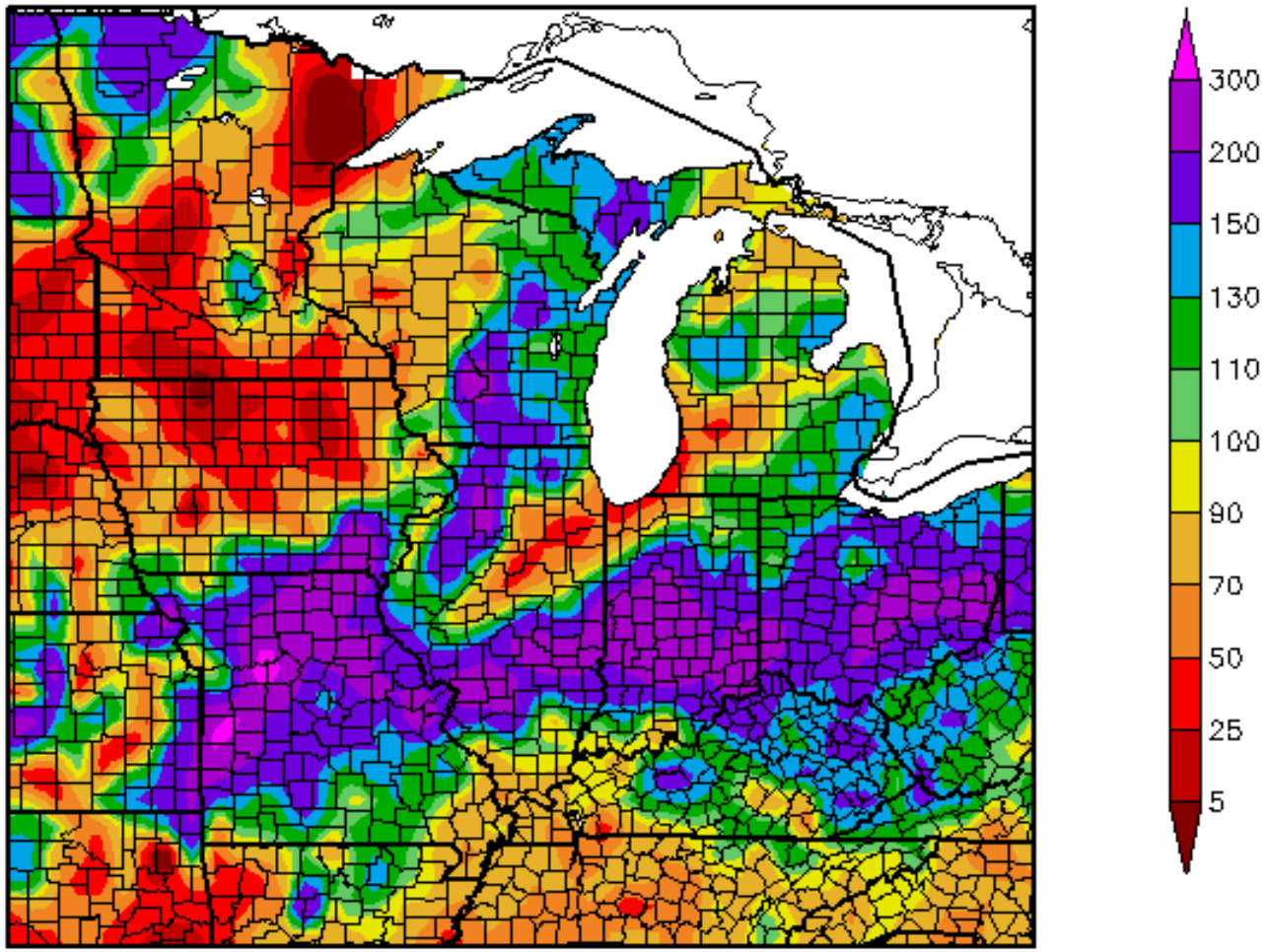
Data source: Missouri Agricultural Statistics Service

Monthly Average Precipitation for Milan (1971-2000)



Percent of Normal Precipitation (%)
12/10/2003 - 1/8/2004

30 DAY

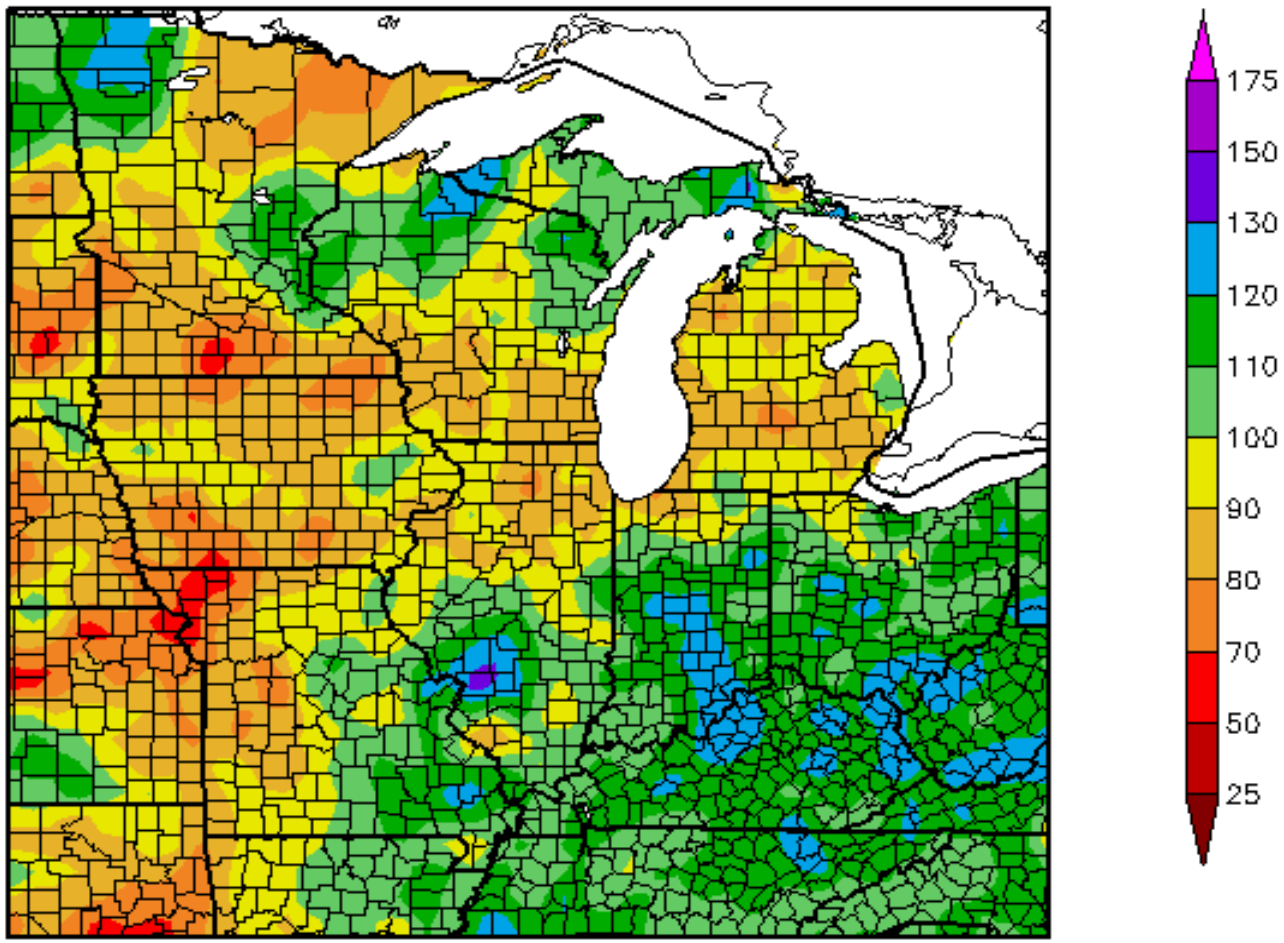


Generated 1/9/2004 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
1/9/2002 – 1/8/2004

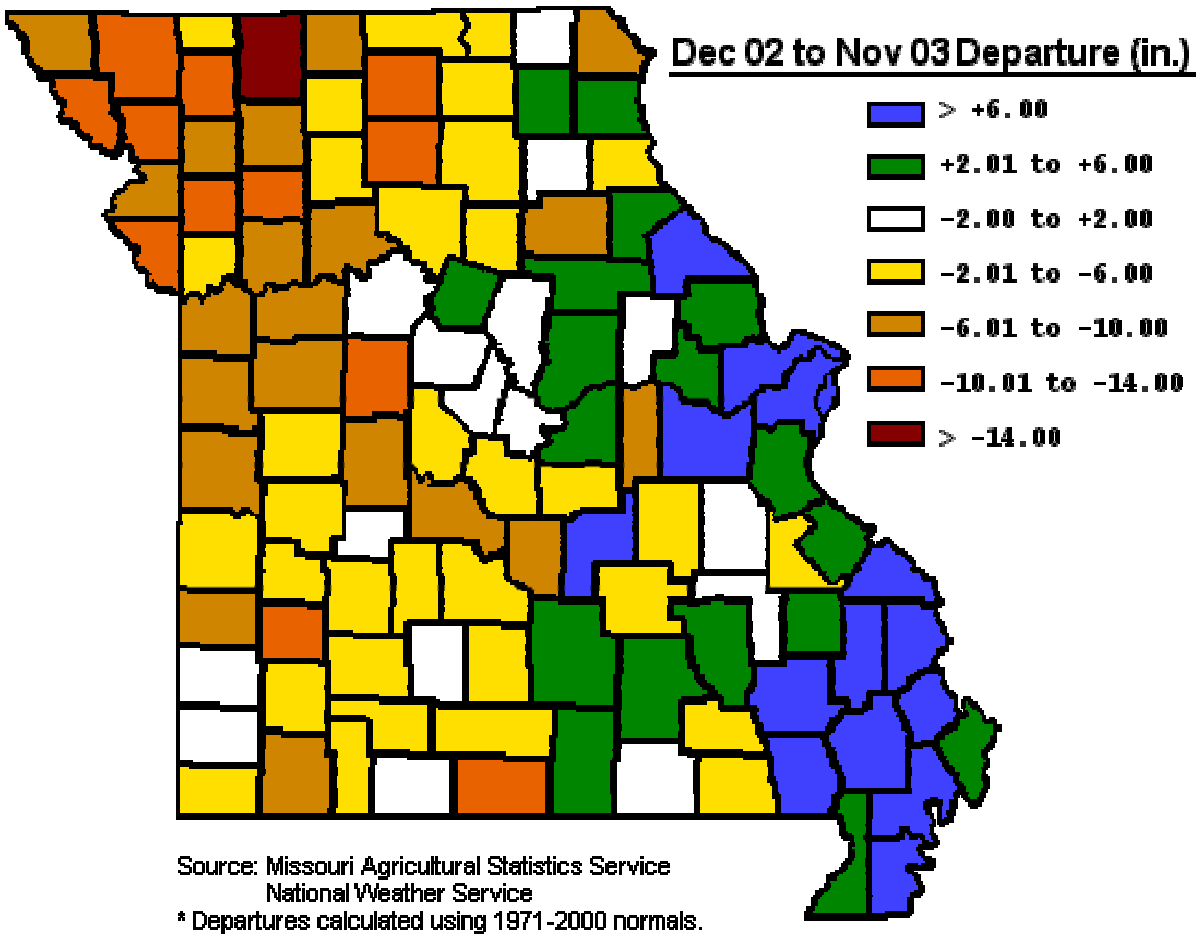
24 MONTH



Generated 1/9/2004 at HPRCC using provisional data.

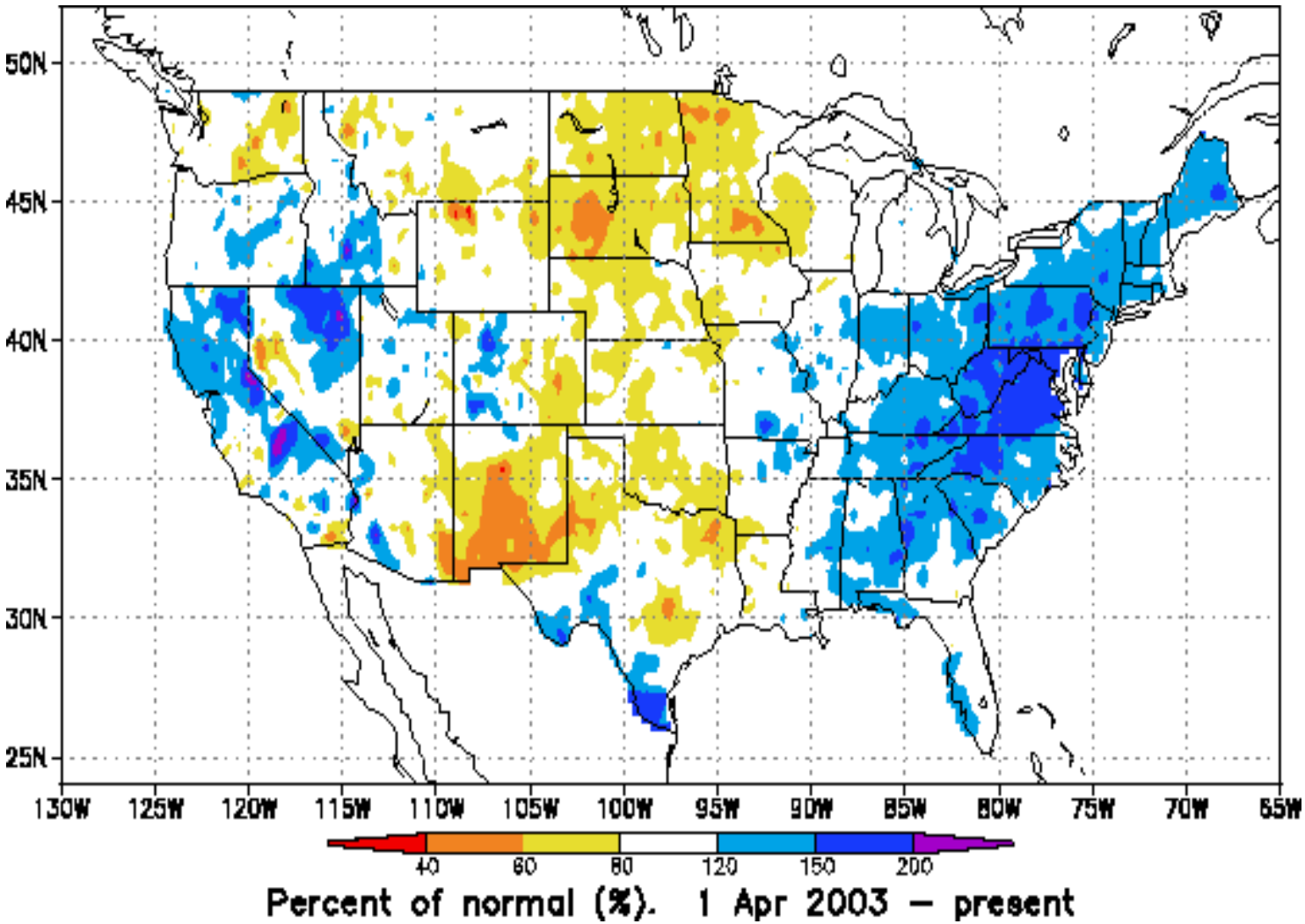
NOAA Regional Climate Centers

Missouri County Precipitation Departure from Normal
From December 2002 to November 2003

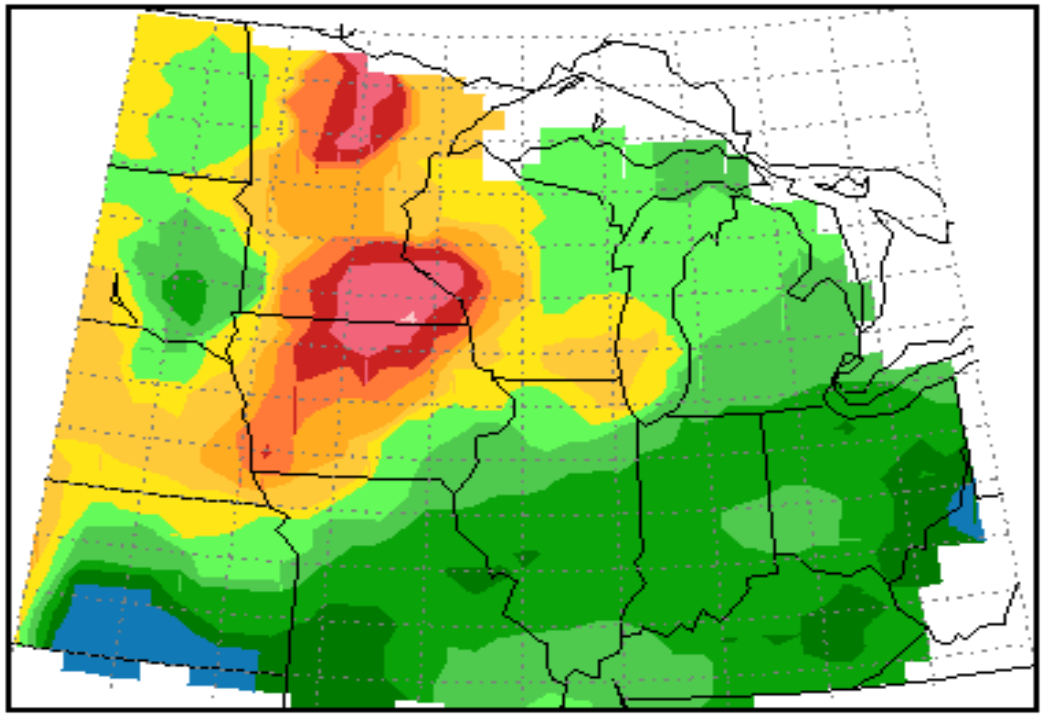


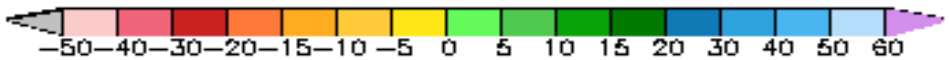
Source: Missouri Agricultural Statistics Service
National Weather Service
* Departures calculated using 1971-2000 normals.

Regional Accumulated Daily Precipitation



Current Soil Moisture Deviation (%), Depth = 0-72
January-8-2004

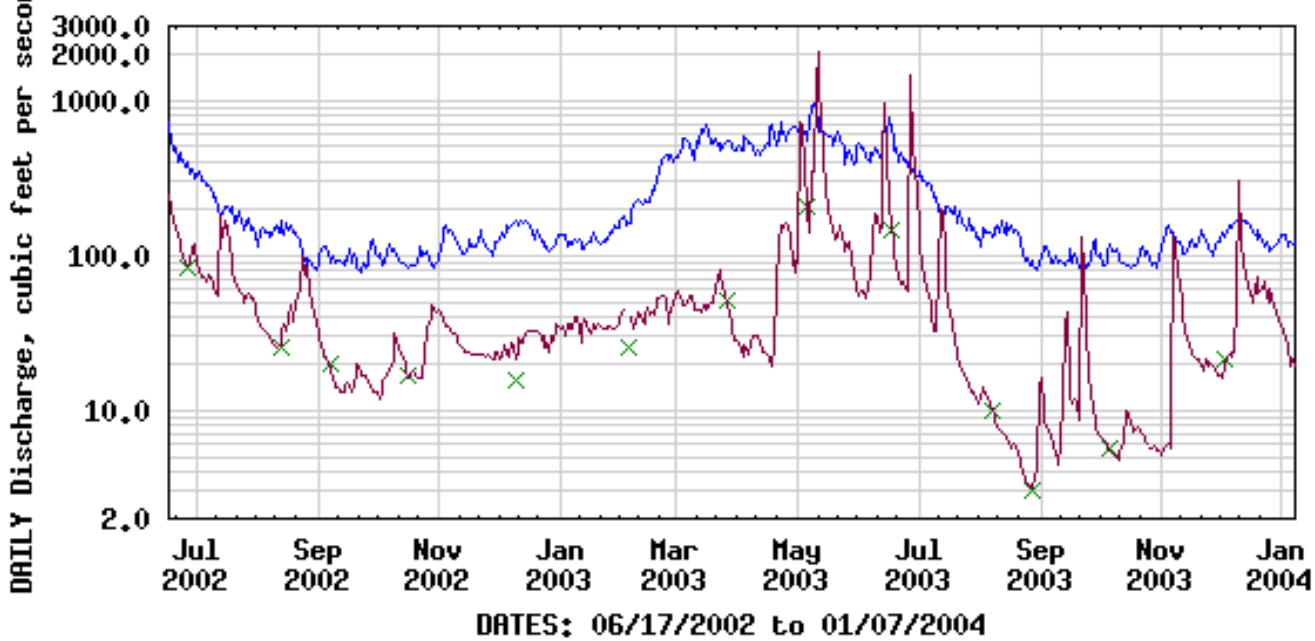




Midwestern Regional Climate Center
Illinois State Water Survey
Champaign, Illinois

USGS

USGS 06897500 Grand River near Gallatin, MO



EXPLANATION

—— MEDIAN DAILY STREAMFLOW BASED ON 82 YEARS OF RECORD

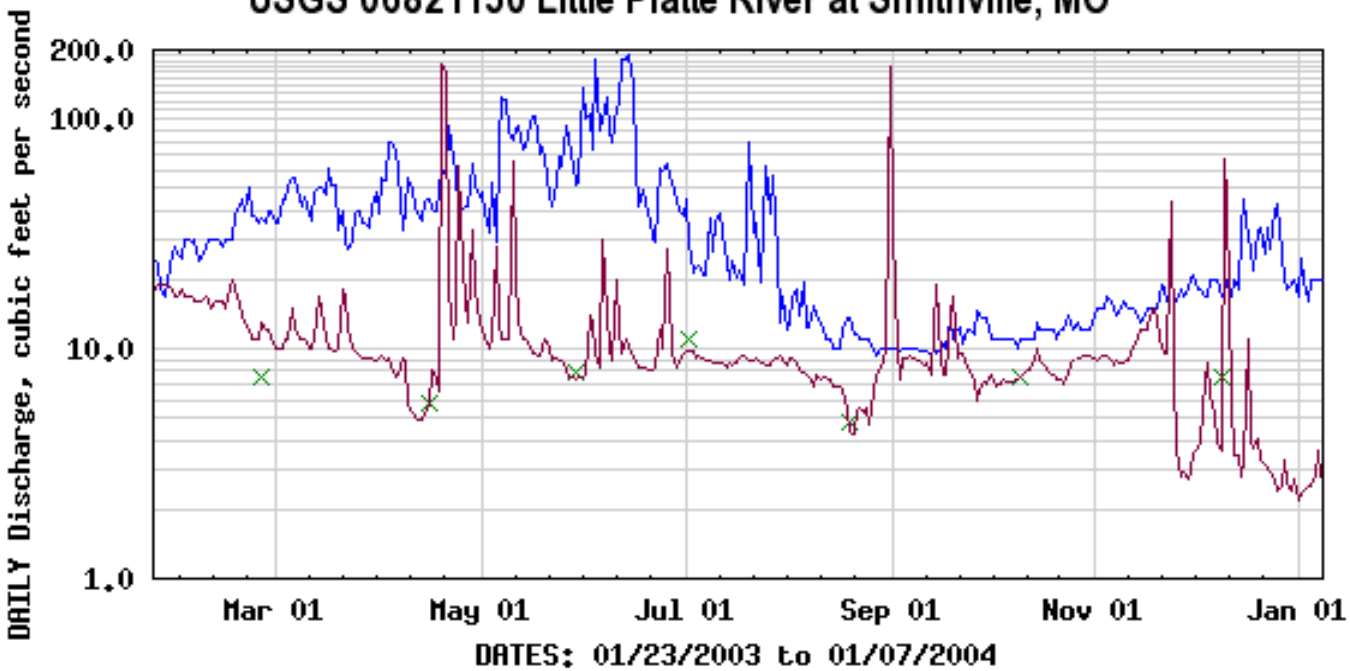
× MEASURED Discharge

—— DAILY MEAN DISCHARGE

Provisional Data Subject to Revision

USGS

USGS 06821150 Little Platte River at Smithville, MO



EXPLANATION

- MEDIAN DAILY STREAMFLOW BASED ON 37 YEARS OF RECORD
- × MEASURED Discharge
- DAILY MEAN DISCHARGE

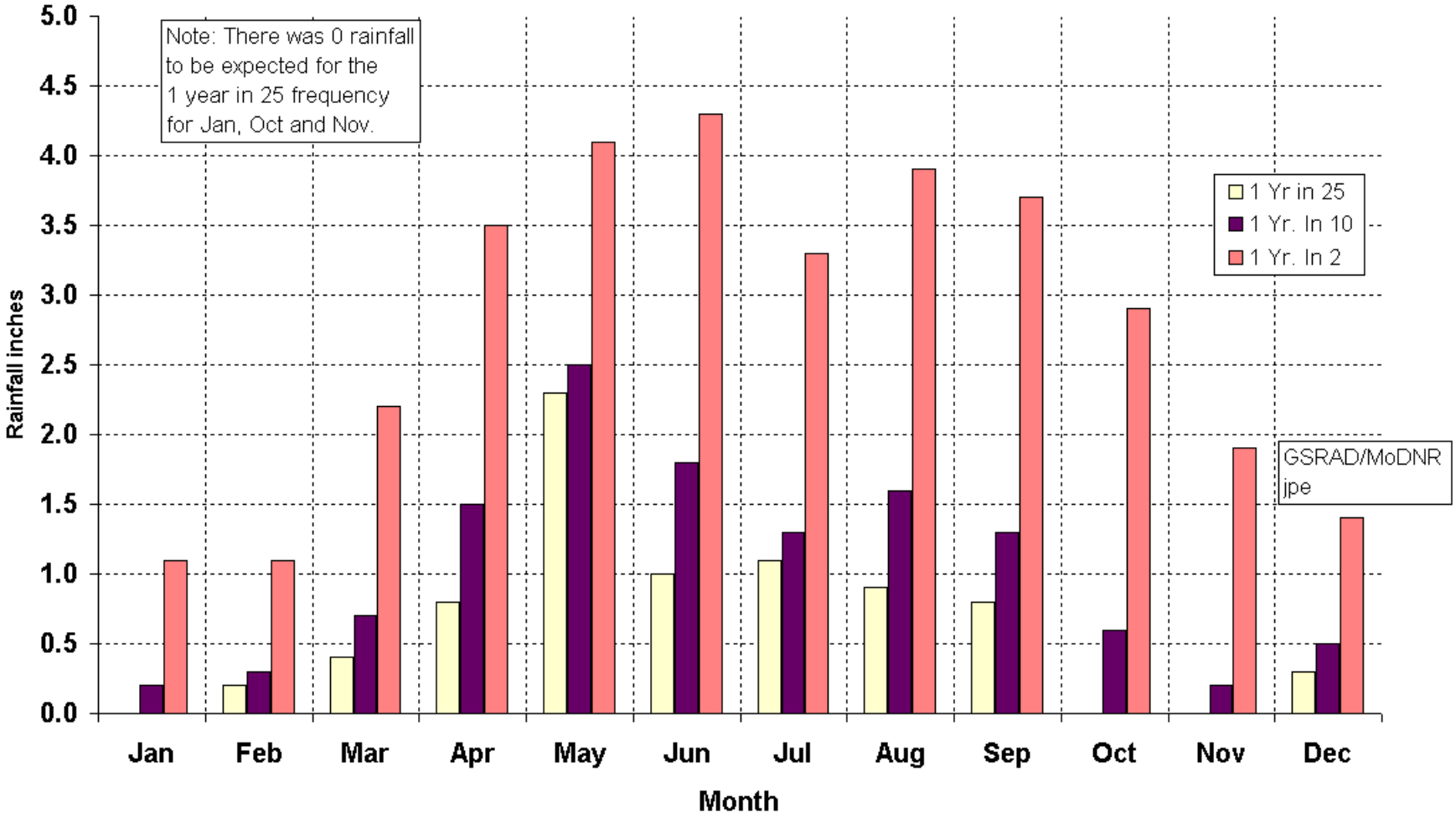
Provisional Data Subject to Revision

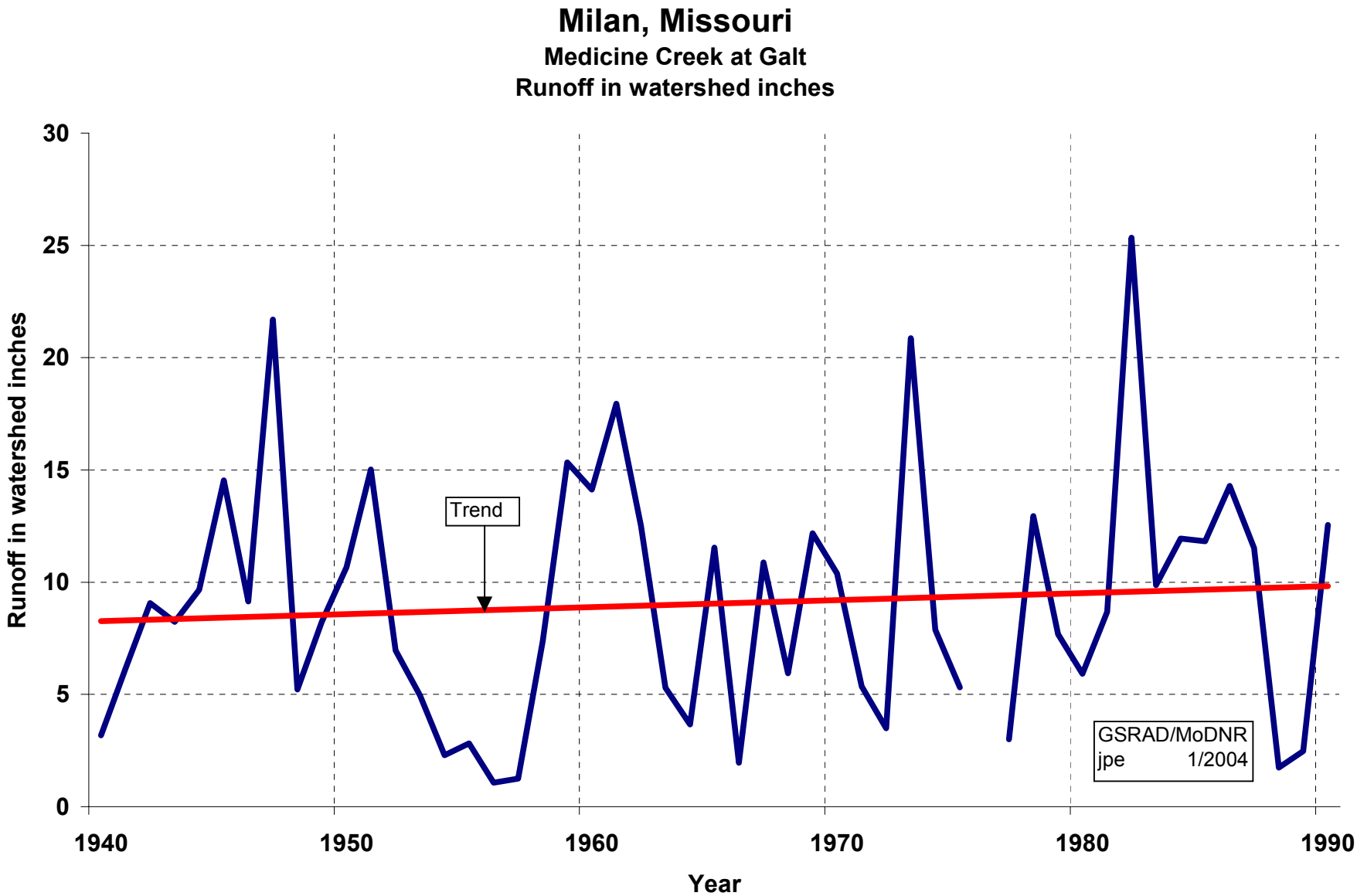

Thompson River Jan. 2004

Elmwood Reservoir Predictive Model

Milan, Missouri

Non excedent Rainfall Amounts by Frequency
Period of Record 1950 through 2000

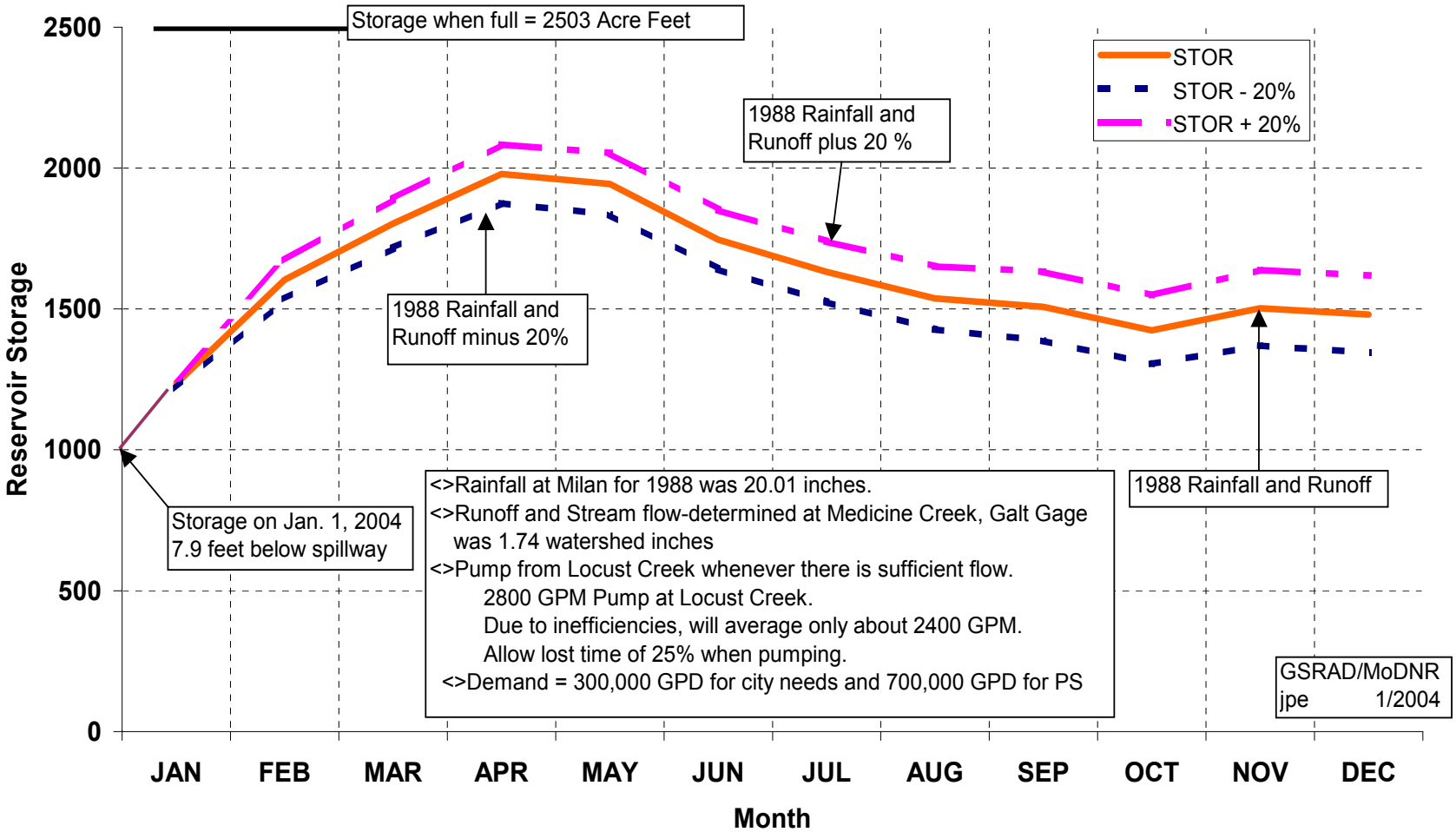



Milan, Missouri
Medicine Creek at Galt
Runoff in watershed inches
Runoff in watershed inches
30
25
20
15
10
5
0
1940
1950
1960
1970
1980
1990
Year
Trend
GSRAD/MoDNR
jpe 1/2004

Milan, Missouri

Elmwood Reservoir

Projected storage using 1988 rainfall and runoff with todays demand

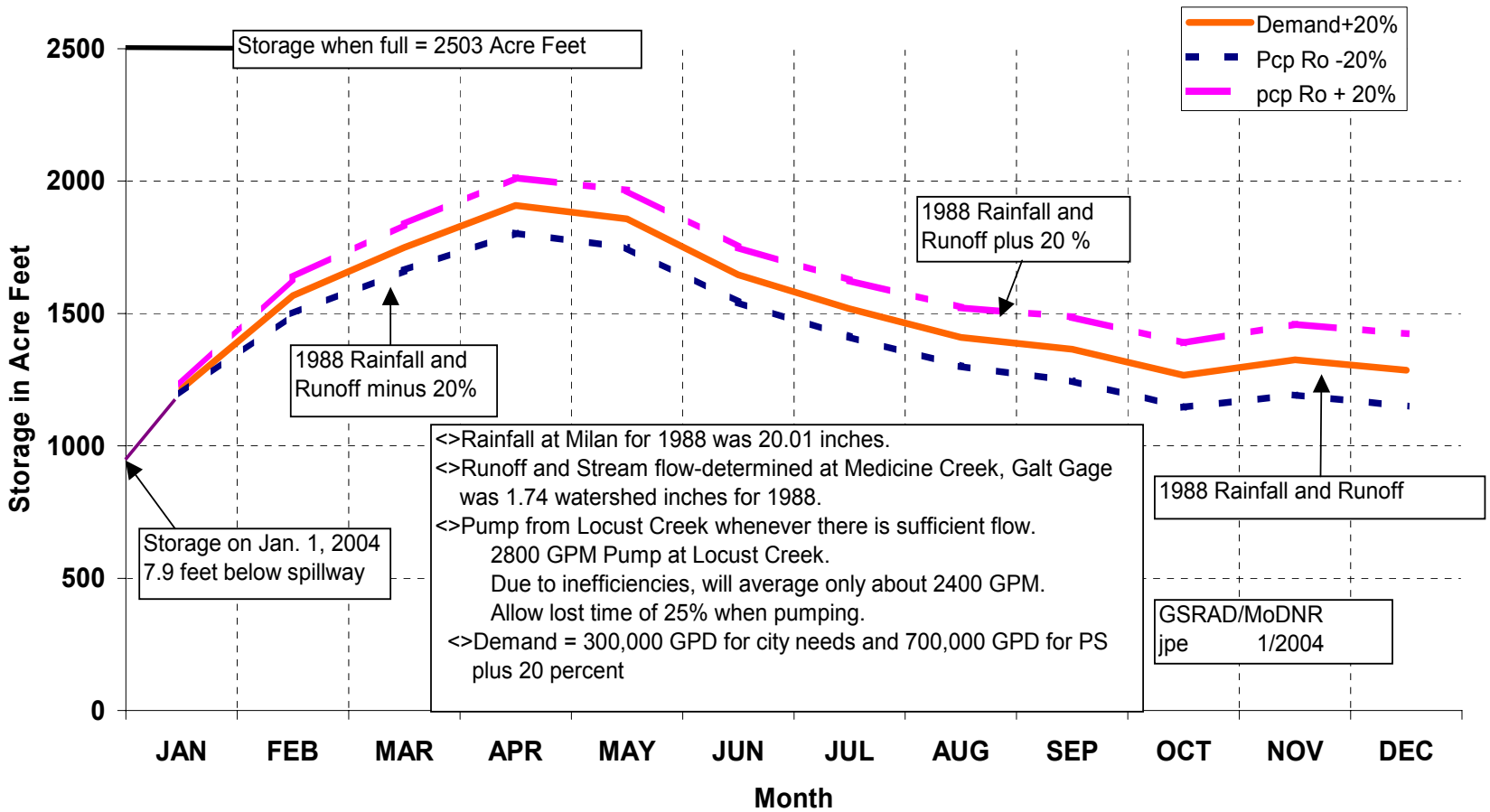


Milan, Missouri

Elmwood Reservoir

Projected Storage using 1988 Rainfall and Runoff

With todays demand plus 20 percent



Milan, Missouri

Days by month that flow in Locust Creek was sufficient for Pumping. 1/04

Flow in Locust Creek should have enough flow to allow for 7-Day Q-10 Frequency flow for downstream flow requirements before pumping begins.

Number of days can pump

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1988	31	29	31	30	18	5	10	10	10	5	17	9

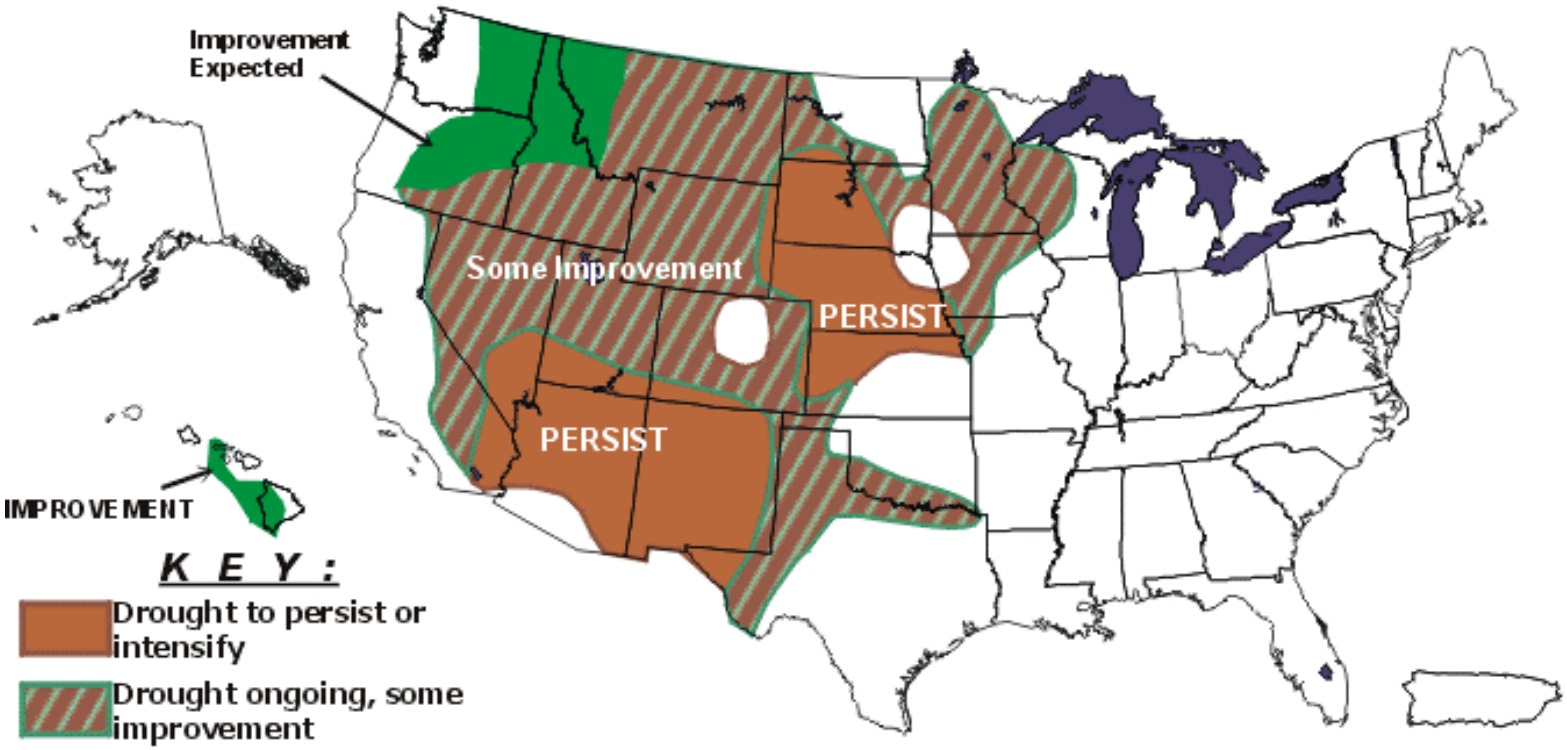
Acre Feet that can be pumped

1988	246.6	230.7	246.6	238.6	143.2	39.77	79.54	79.54	79.54	39.77	135.2	71.58

U. S. Seasonal Drought Outlook

Through March 2004

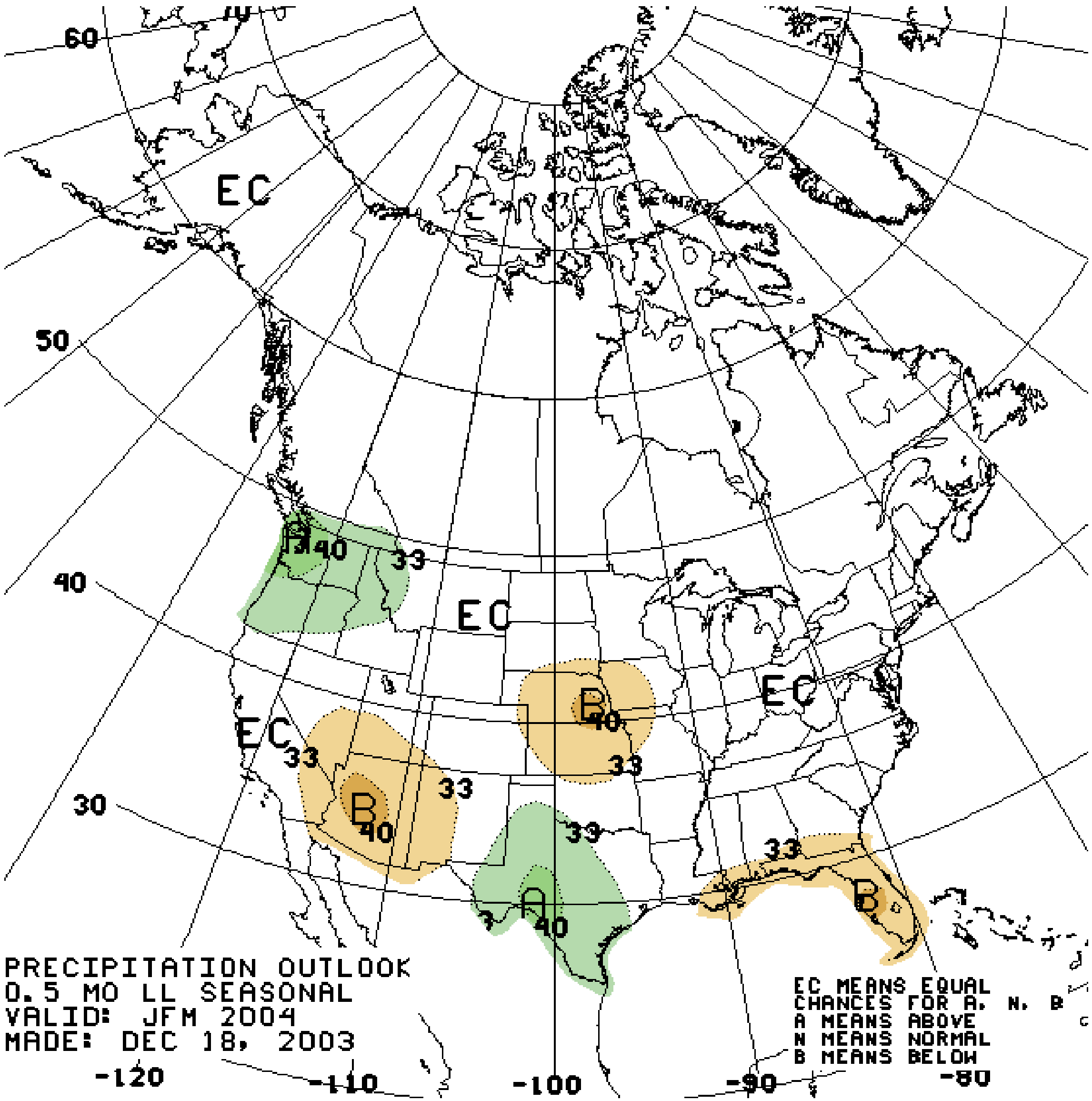
Released December 18, 2003



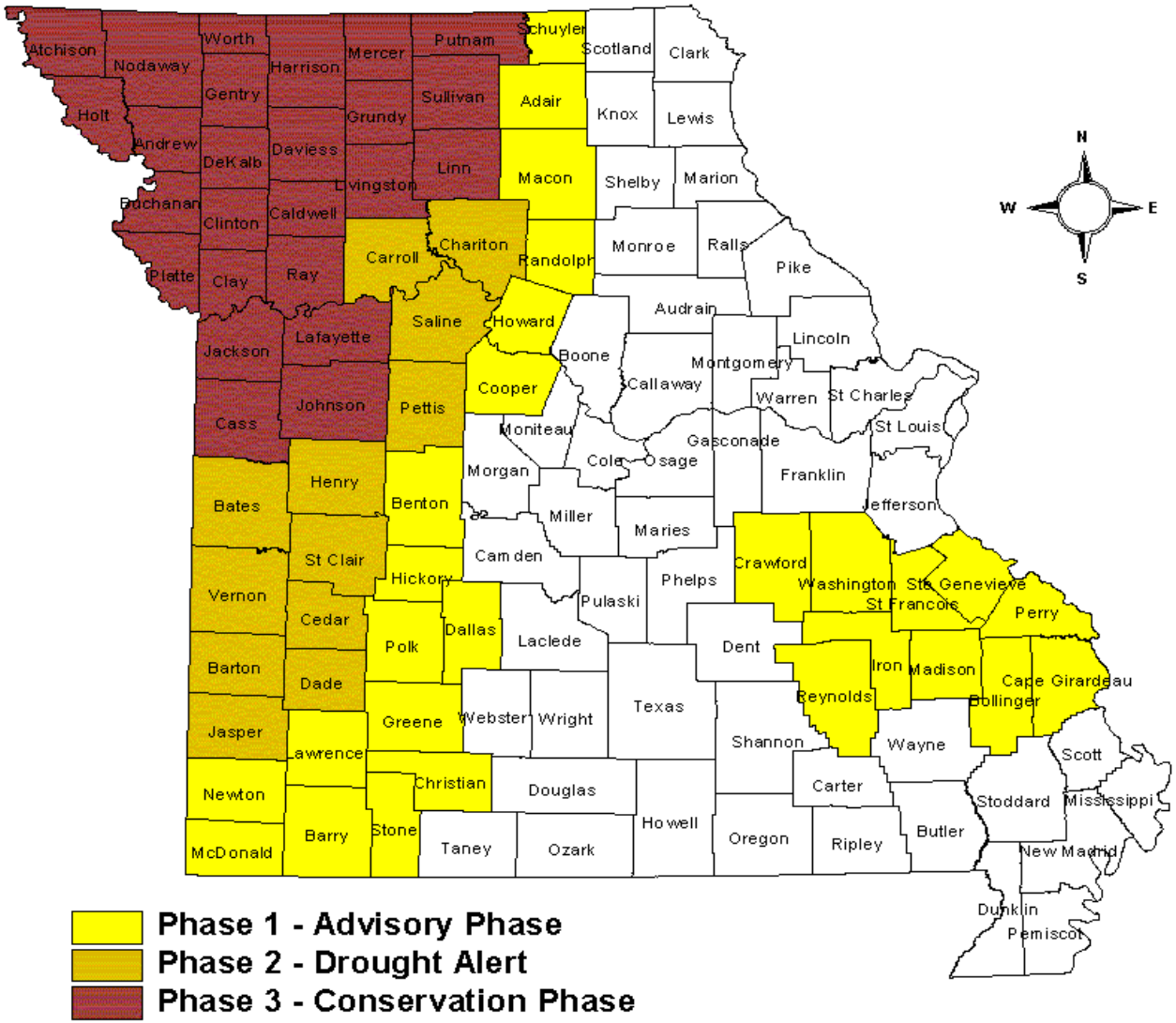
K E Y :

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

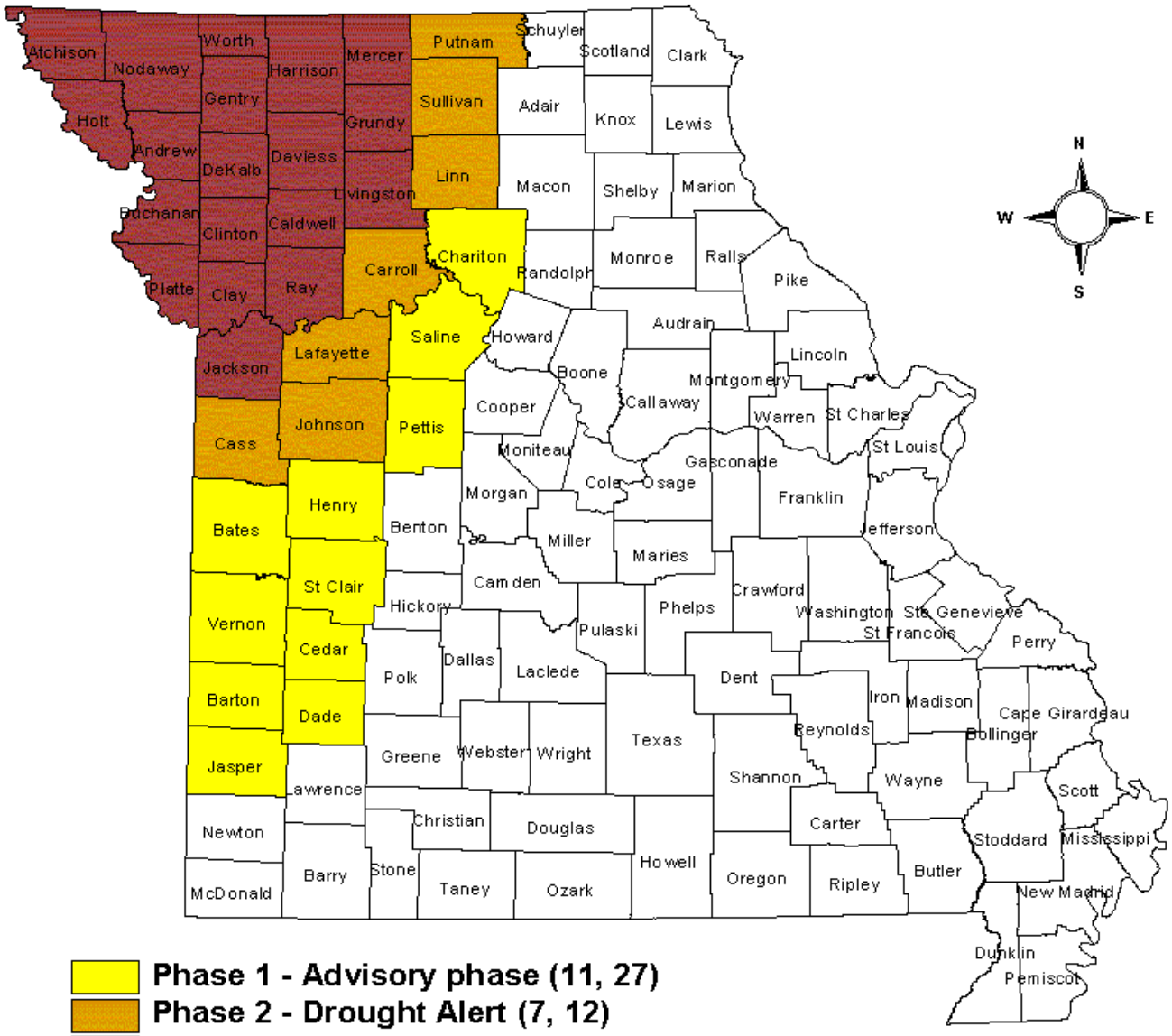
Depicts general, large-scale trends based on subjectively derived probabilities guided by numerous indicators, including short and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance, so use caution if using this outlook for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are schematically approximated from the Drought Monitor (D1 to D4). For weekly drought updates, see the latest Drought Monitor map and text.


60
50
40
30
70
EC
EC
EC
EC
A
40
33
B
40
33
B
40
33
33
A
40
33
33
B
PRECIPITATION OUTLOOK
0.5 MO LL SEASONAL
VALID: JFM 2004
MADE: DEC 18, 2003
EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW
-120
-110
-100
-90
-80

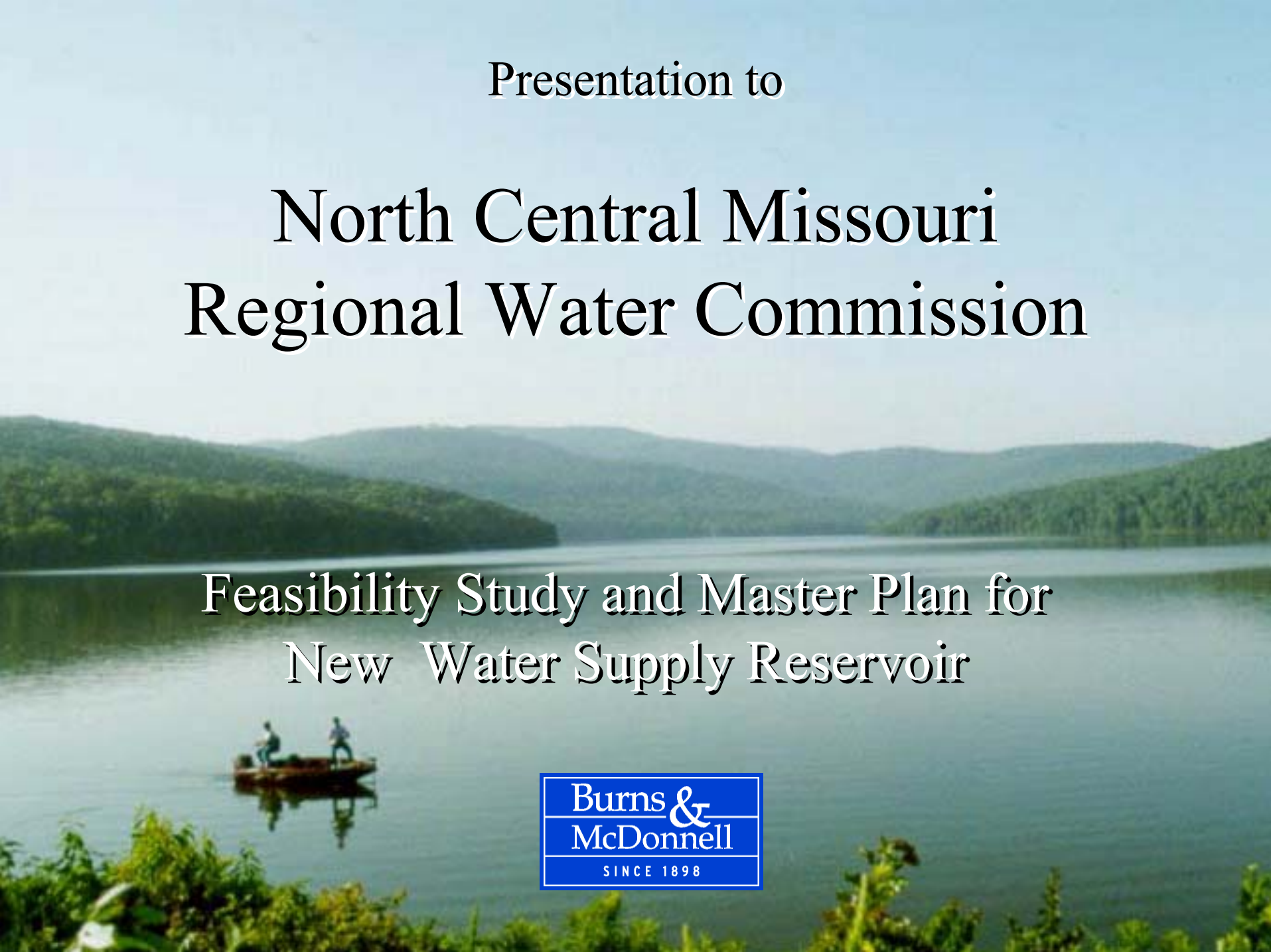
Drought Condition Status (November 13, 2003)



Interim Drought Condition Status (January 12, 2004)



Feasibility Study and Master Plan for New Water Supply Reservoir



Presentation to

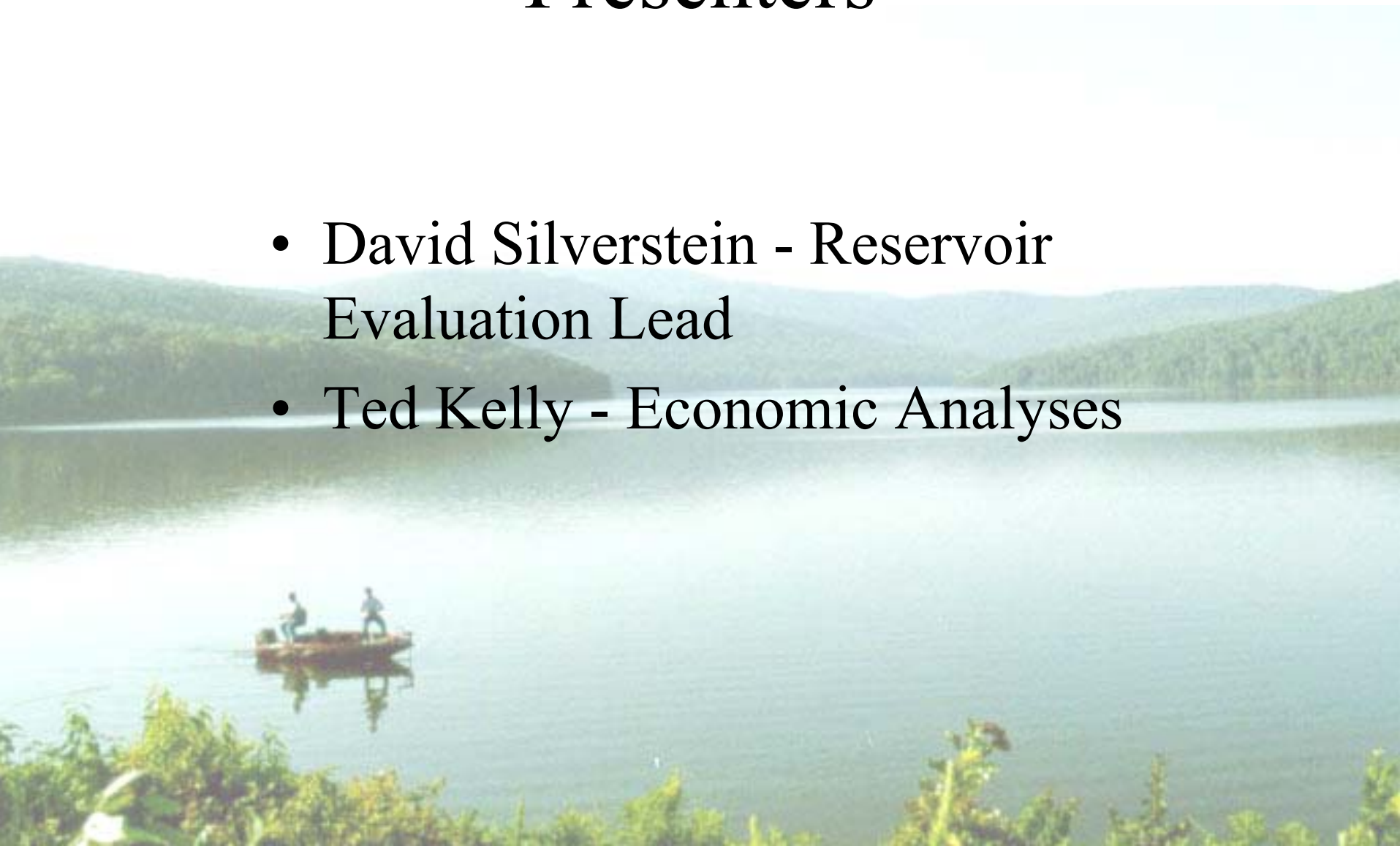
North Central Missouri Regional Water Commission

Feasibility Study and Master Plan for New Water Supply Reservoir

Burns & McDonnell
SINCE 1898

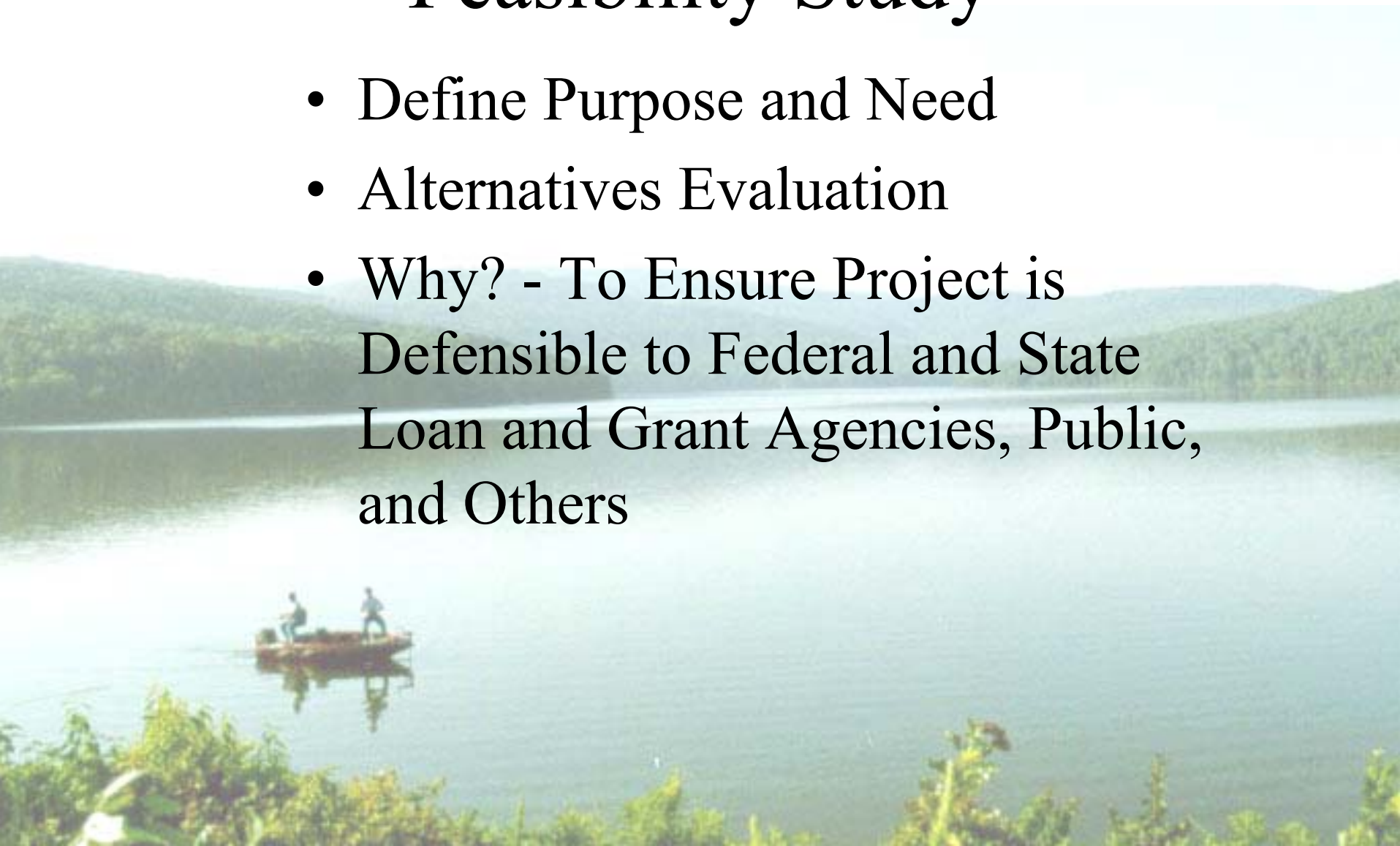
Presenters

- David Silverstein - Reservoir Evaluation Lead
- Ted Kelly - Economic Analyses



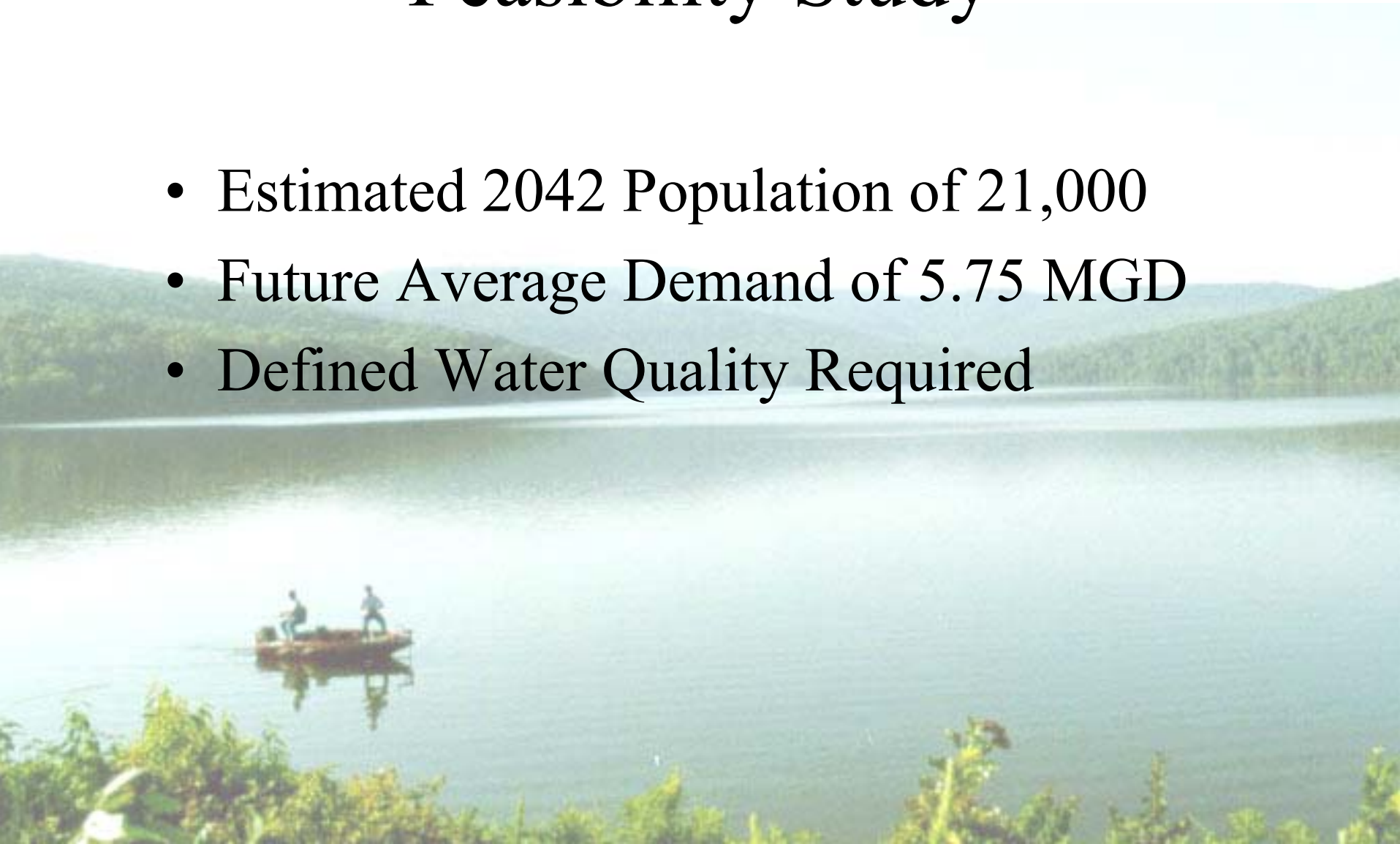
Feasibility Study

- Define Purpose and Need
- Alternatives Evaluation
- Why? - To Ensure Project is Defensible to Federal and State Loan and Grant Agencies, Public, and Others



Feasibility Study

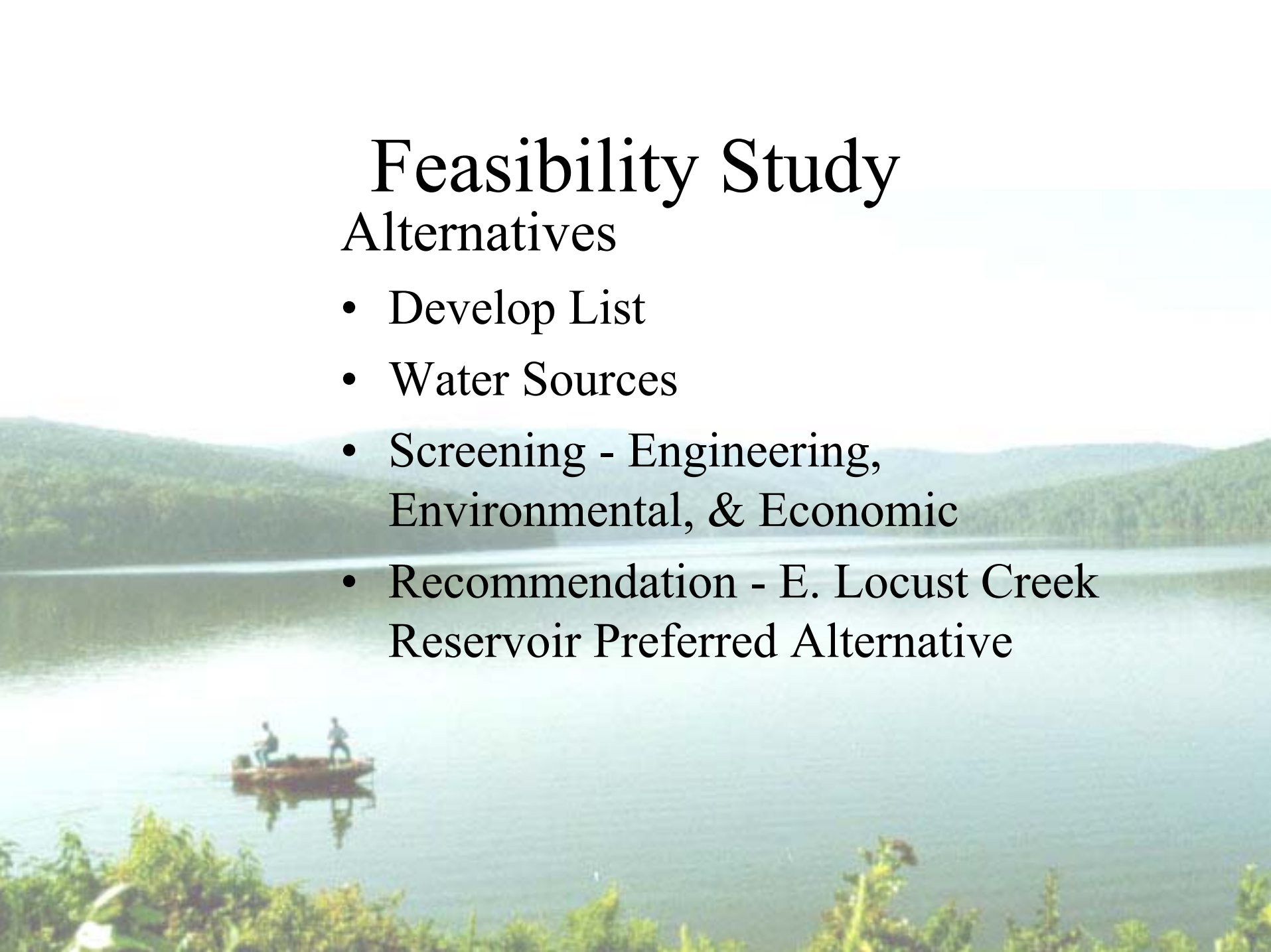
- Estimated 2042 Population of 21,000
- Future Average Demand of 5.75 MGD
- Defined Water Quality Required



Feasibility Study

Alternatives

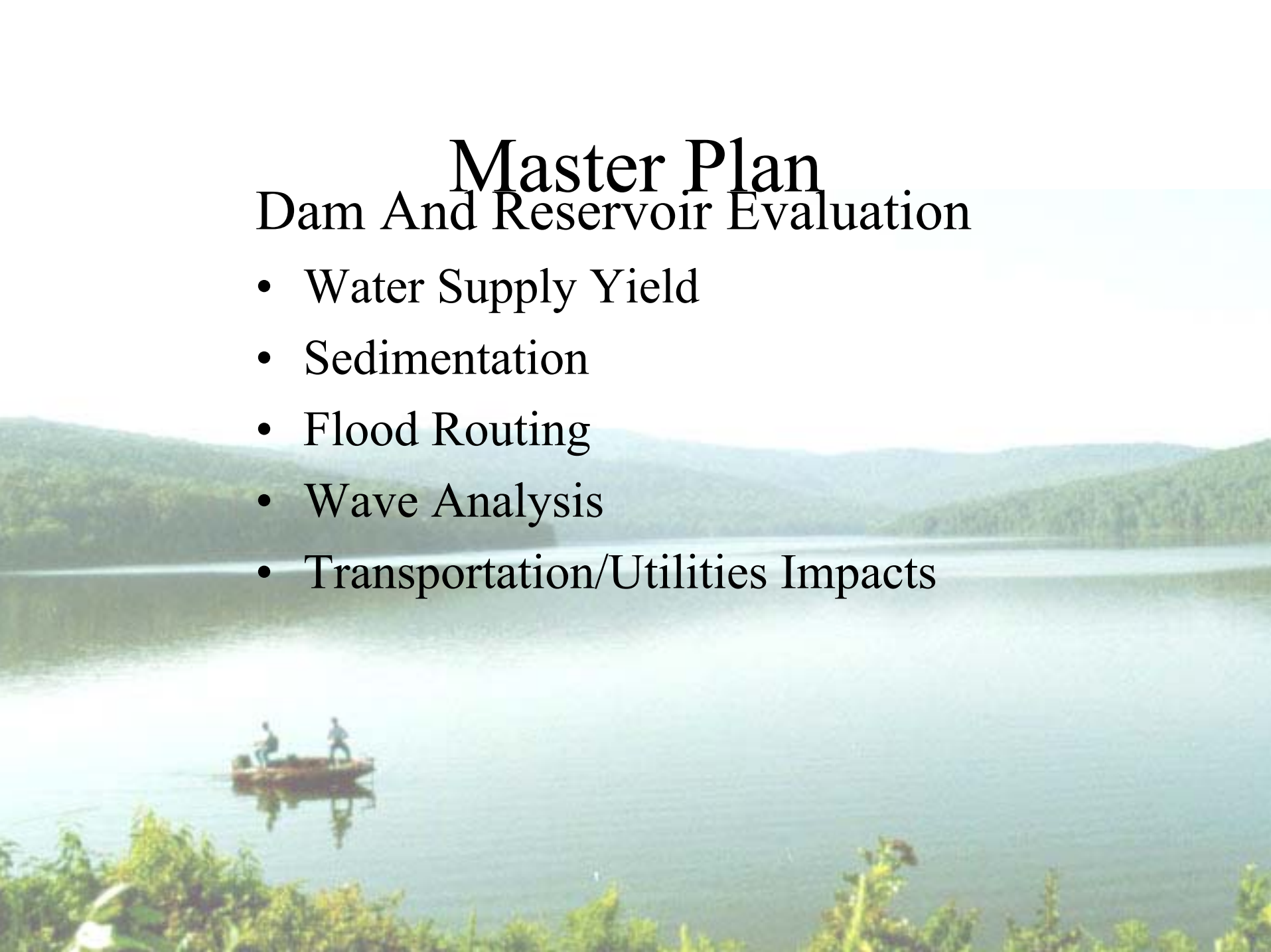
- Develop List
- Water Sources
- Screening - Engineering, Environmental, & Economic
- Recommendation - E. Locust Creek Reservoir Preferred Alternative



Master Plan

Dam And Reservoir Evaluation

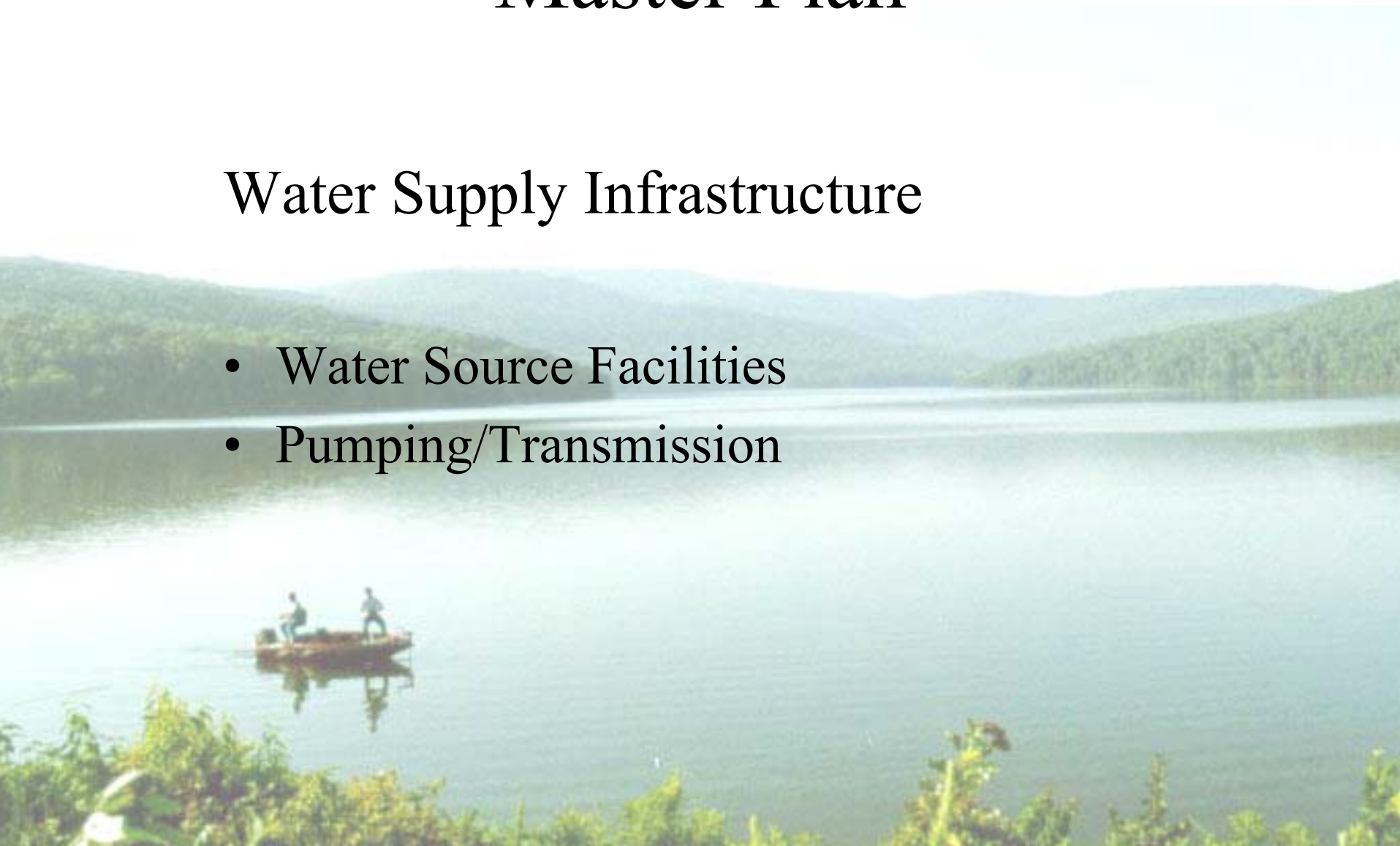
- Water Supply Yield
- Sedimentation
- Flood Routing
- Wave Analysis
- Transportation/Utilities Impacts



Master Plan

Water Supply Infrastructure

- Water Source Facilities
- Pumping/Transmission



Master Plan

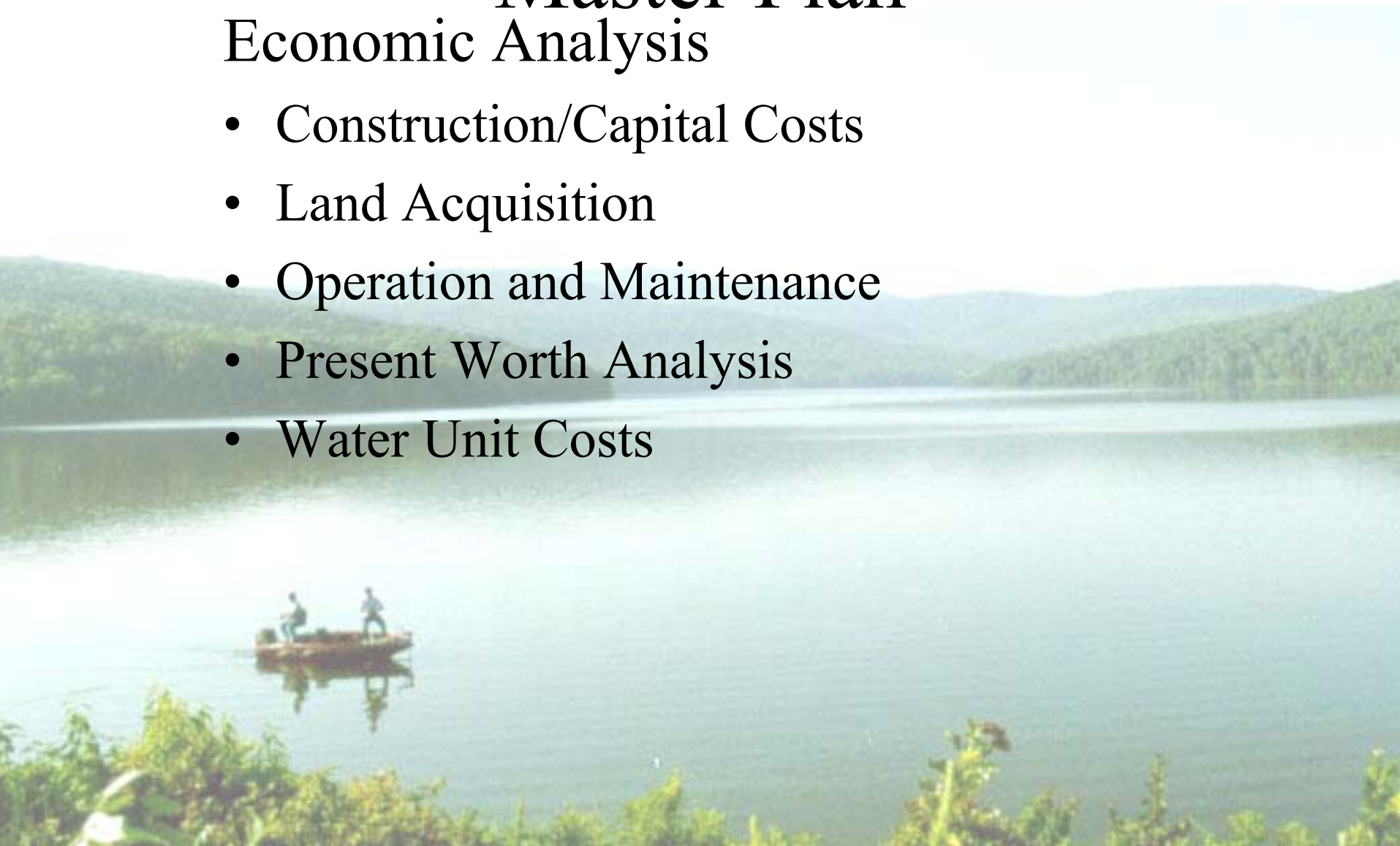
Environmental Analysis

- Wetland Impacts
- Threatened and Endangered Species
- Cultural Resources
- Social Impacts

Master Plan

Economic Analysis

- Construction/Capital Costs
- Land Acquisition
- Operation and Maintenance
- Present Worth Analysis
- Water Unit Costs



Master Plan

Yield Results:

- 5.75 MGD can be provided with a Pool Elevation of 910’.
  - Considers Sedimentation
  - Provides Pool for Fish and Wildlife
  - Allows for Seepage Losses and Required Flow Releases
- Probability of Failure 2%
- Relatively Stable Pool Except During Drought

Master Plan

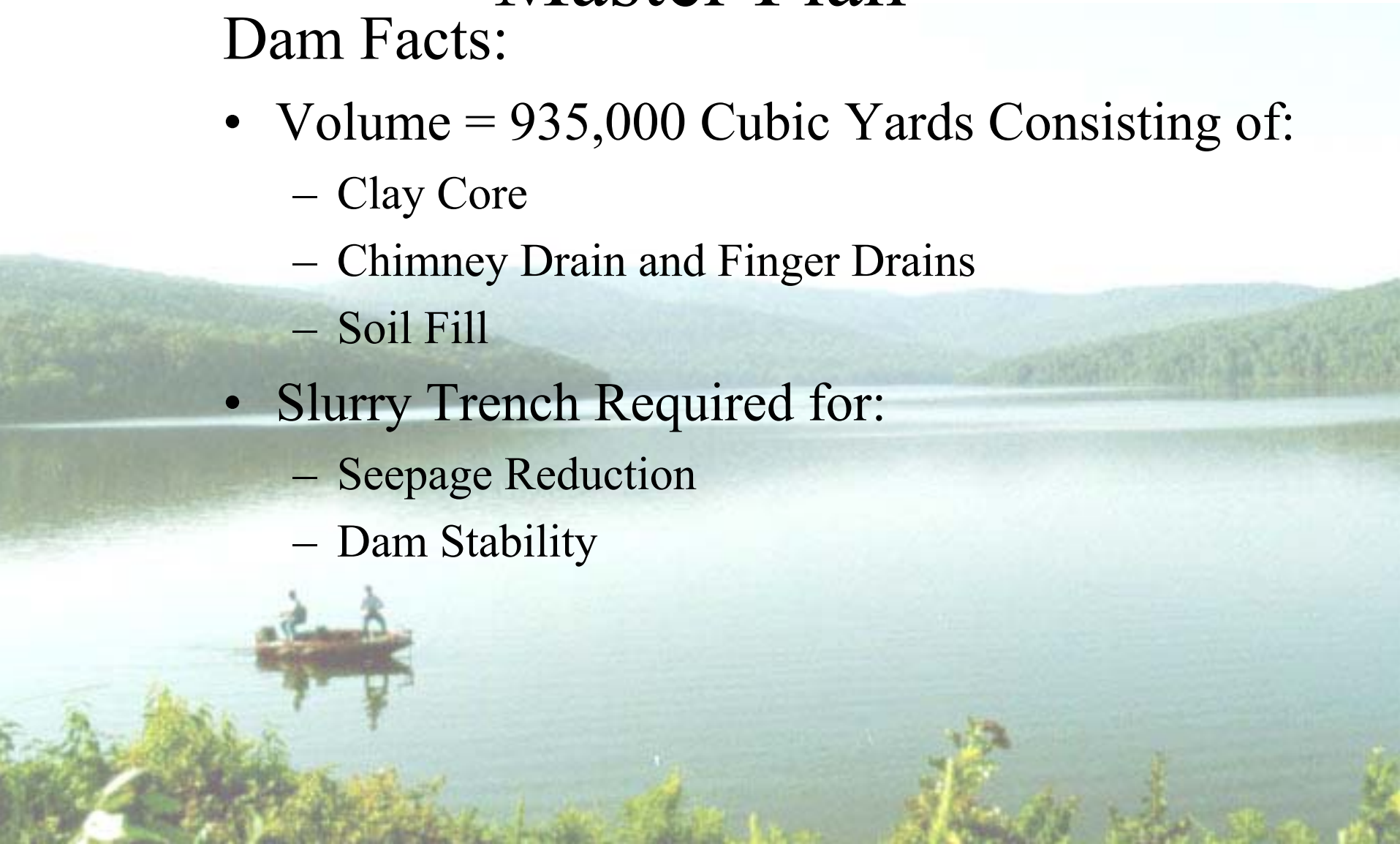
Dam and Reservoir:

- Drainage Area of 32.9 Square Miles
- Pool Area at El. 910’ = 1600 Acres
- Pool Volume = 34,000 Acre Feet
- Maximum Flood Elevation = 928’
- Top of Dam = El. 933’ (Max. Height = 73 Ft.)
- Approx.. Dam Length = 2100 Feet
- Spillway = 25’ Dia. Drop Inlet & 13’ Dia. Pipe
- Aux. Spillway = 400’ Cut in West Abutment

Master Plan

Dam Facts:

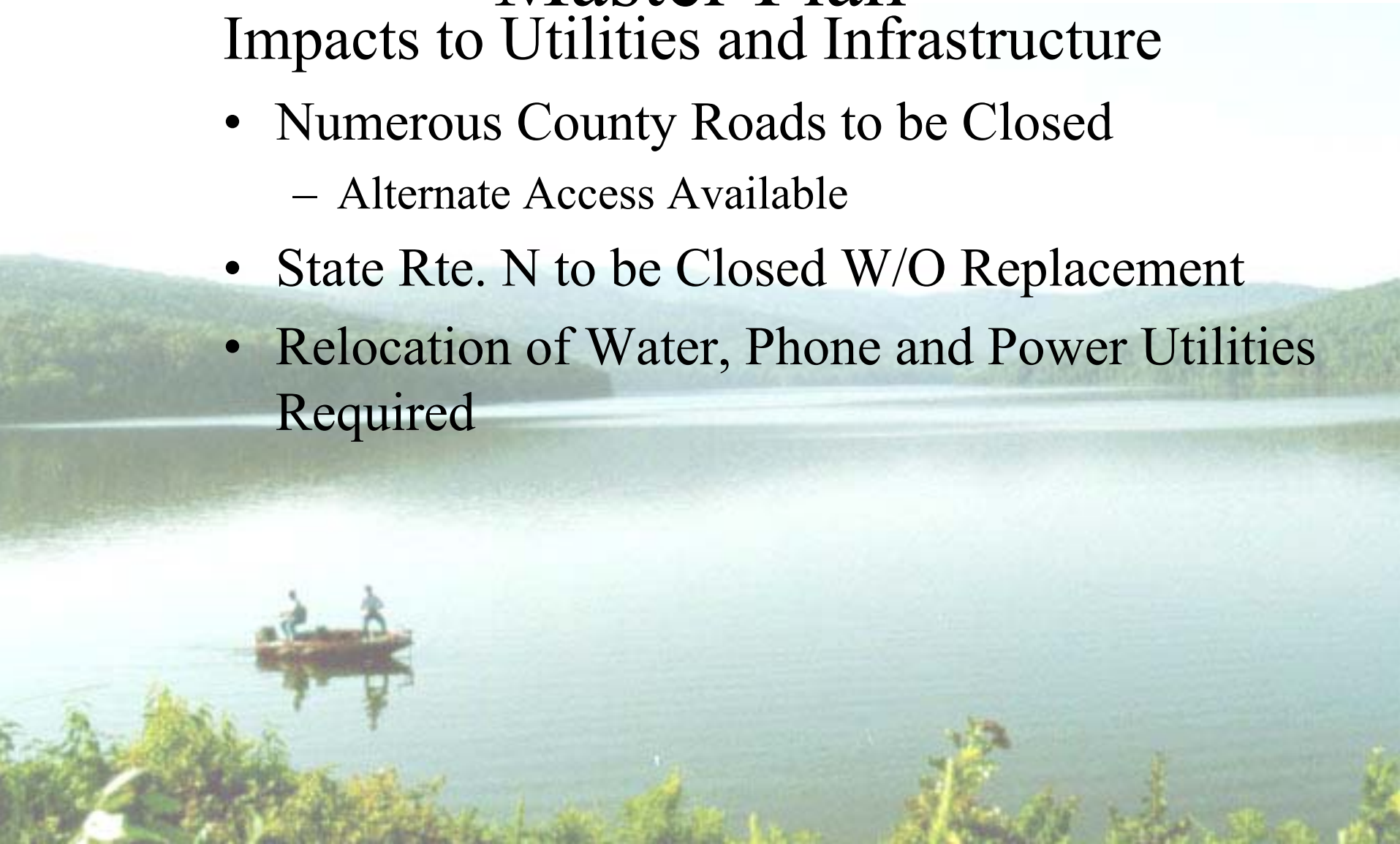
- Volume = 935,000 Cubic Yards Consisting of:
  - Clay Core
  - Chimney Drain and Finger Drains
  - Soil Fill
- Slurry Trench Required for:
  - Seepage Reduction
  - Dam Stability



Master Plan

Impacts to Utilities and Infrastructure

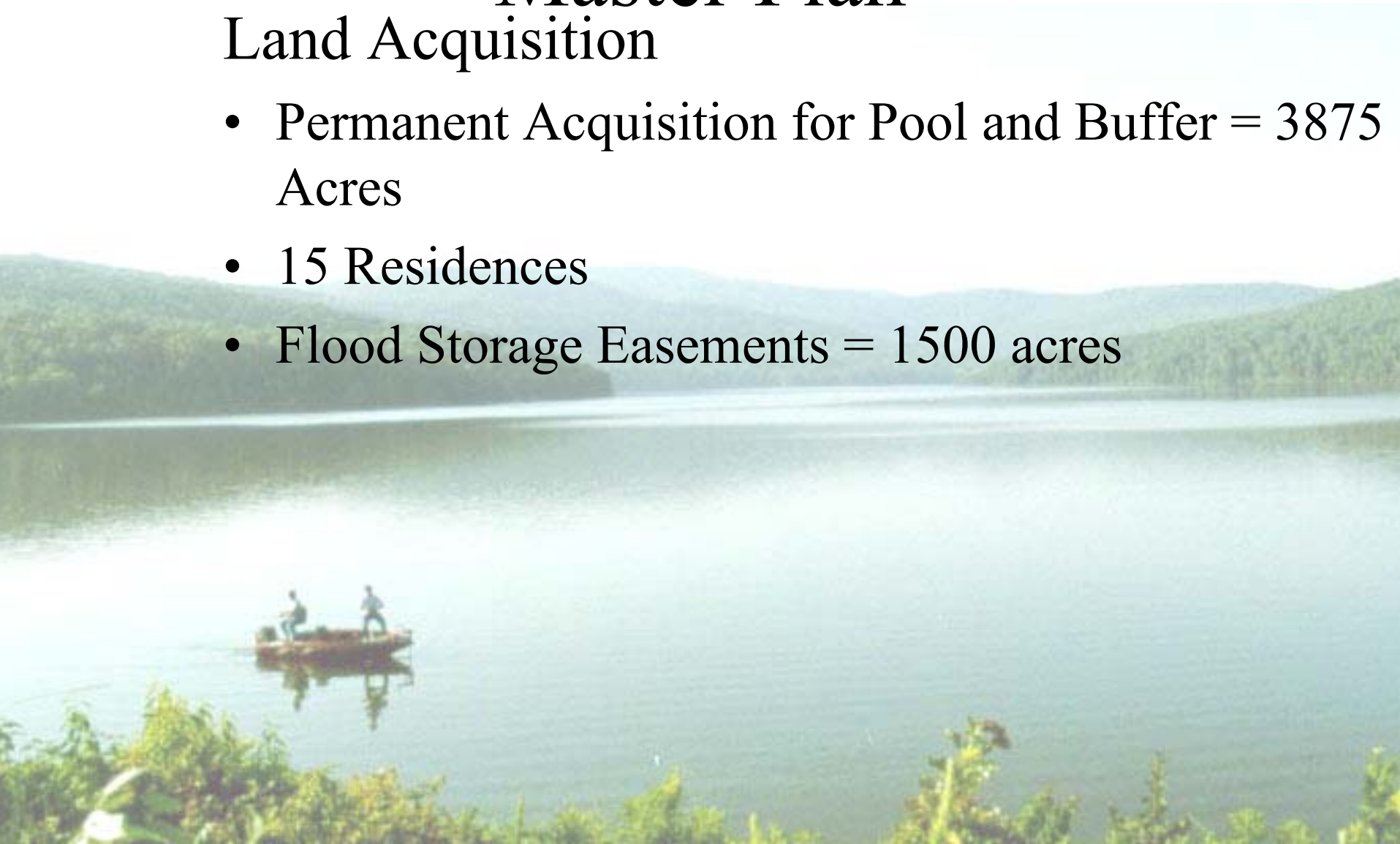
- Numerous County Roads to be Closed
  - Alternate Access Available
- State Rte. N to be Closed W/O Replacement
- Relocation of Water, Phone and Power Utilities Required



Master Plan

Land Acquisition

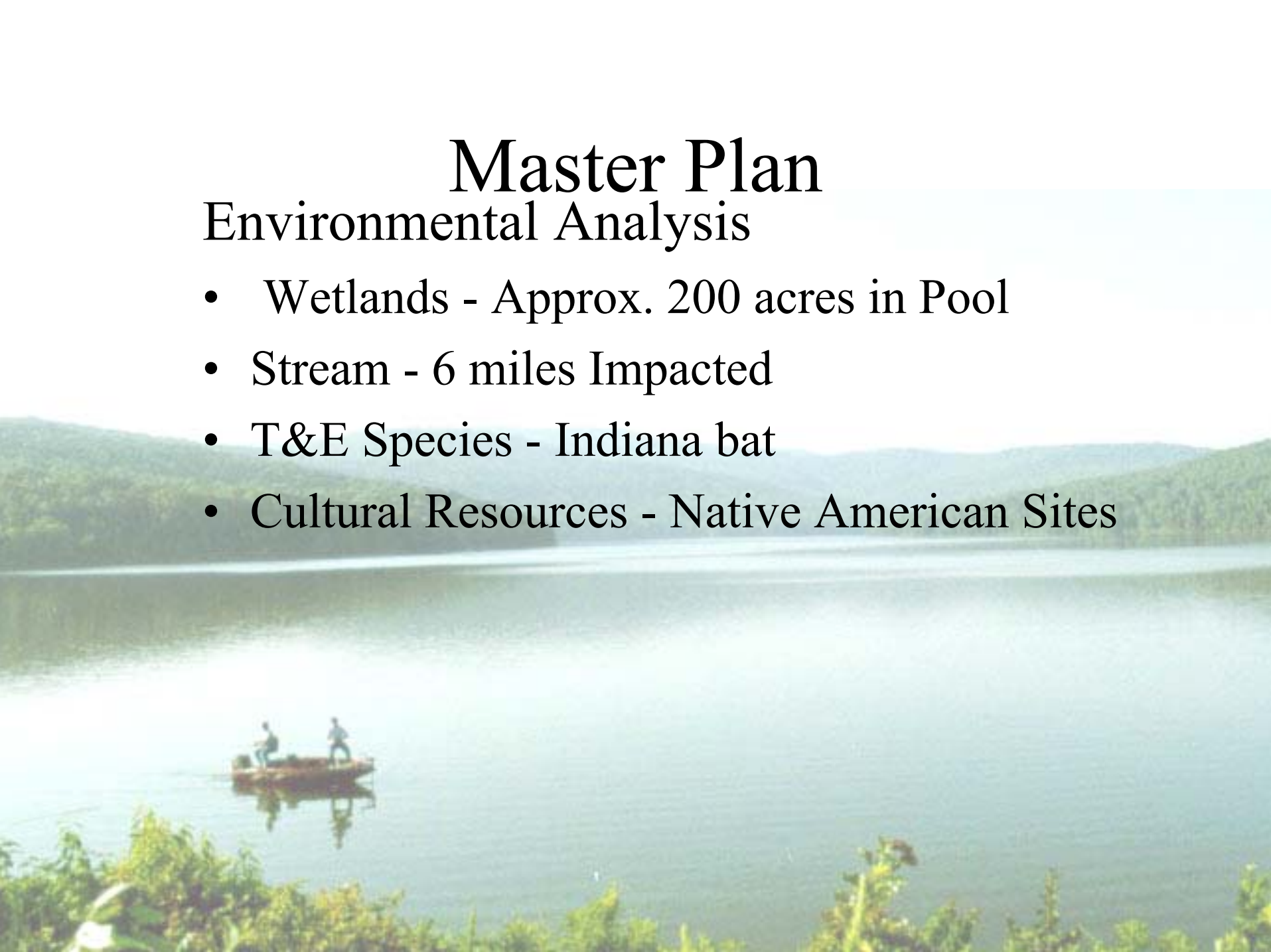
- Permanent Acquisition for Pool and Buffer = 3875 Acres
- 15 Residences
- Flood Storage Easements = 1500 acres



Master Plan

Environmental Analysis

- Wetlands - Approx. 200 acres in Pool
- Stream - 6 miles Impacted
- T&E Species - Indiana bat
- Cultural Resources - Native American Sites



Master Plan

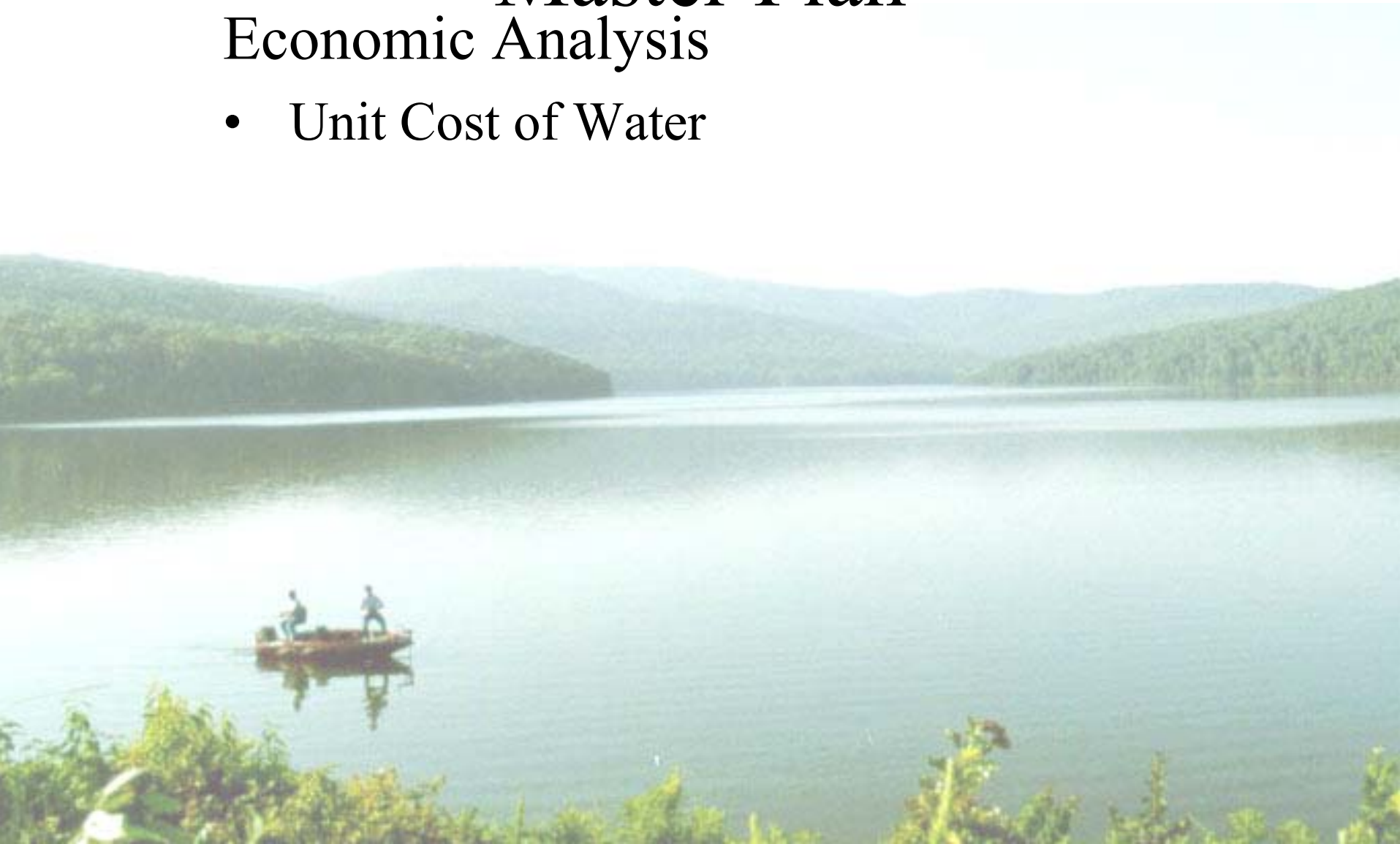
Economic Analysis

- Capital Costs
  - Water Treatment Plant - $5.18M
  - Dam and Reservoir - $11.26M (75% Sponsor)
  - Water Supply Improvements and Infrastructure Costs - $4.96M
  - Land Acquisition - $5.5M
  - Engineering, Surveys, Geotech, Legal - $3.24M
  - Wetland and Archeological Mitigation - $1.3M
  - Total Cost - $31.44M ($20.74M NCMRWC)

Master Plan

Economic Analysis

- Unit Cost of Water



Key Inputs – Plant Purchase

Starting Year	2004

Water Plant Capital

Milan Plant Purchase Capital Requirement	$3,564,500
Milan Plant Purchase Additional Capital	$482,200
Milan Plant Purchase Grant Funding	$1,214,000
Milan Plant Purchase Capital less Grants	$2,832,700

Supplemental Pipeline & Intake Capital Requirement	$1,136,000
Pipeline & Intake Grant Funding	$0
Pipeline & Intake Capital less Grants	$1,136,000

Interest Rate for Debt Financing	4.75%
Term of Project Financing - years	25

Plant O&M

Inflation Rate for Labor/Materials	4.0%
Inflation Rate for Energy	2.5%
Energy Unit Cost ($/kWh)	$0.0690
Average Monthly Energy Use (kWh)	55,000
Demand Charge ($/kW)	$206
Average Demand (kW)	8.50
Other Utility Costs (Gas?)	20,000
Plant Labor	$109,100
City Labor Offset (10%)	-$10,900
Routine Maintenance (1% of Plant Capital)	$35,600
Chemical Costs per Thousand Gallons	$0.275
General and Administration Expenses	$125,000
Lake Lease per Thousand Gallons	$0.150
Renewal & Replacement Fund Requirement	$20,000

Water Usage

Milan Treated Water	0.350	[1]
Sullivan County #1 Treated Water	0.328	[1]
Green City Treated Water	0.094	[1]
ConAgra Treated Water	0.363	[1]
Other Treated Water Customers (Begin 2010)	0.450	
PSF Raw Water	0.725	[1]
Milan Water Usage Growth	0.68%	
Sullivan County #1 Water Usage Growth	1.71%	
Green City Water Usage Growth	0.98%	
Raw Water Usage Growth (first 10 years)	5.00%	
Raw Water Usage Growth (after 10 years)	2.64%	
ConAgra Water Usage Growth	9.04%	
Other Treated Water Growth	5.00%	

Return

Return (% of O&M expense, Years 1-5)	5%
Return (% of O&M expense, Years10 and beyond)	10%

[1] 2002 Average MGD

Projected Water Costs
Plant Purchase

	Years 1 - 5 $/1000 gal	Years 6 - 10 $/1000 gal	Years 11 - 15 $/1000 gal	Years 16 - 20 $/1000 gal	Years 21 -25 $/1000 gal
No ConAgra, No Grants					
Treated Water	2.6035	1.9949	1.8508	1.8475	1.8507
Raw Water	0.6001	0.3991	0.3783	0.3832	0.3894
Including Grants, No ConAgra					
Treated Water	2.3115	1.7987	1.6952	1.7117	1.7333
Raw Water	0.6001	0.3991	0.3783	0.3832	0.3894
Including ConAgra, No Grants					
Treated Water	1.9053	1.4390	1.2848	1.1961	1.1162
Raw Water	0.5084	0.3137	0.2828	0.2653	0.2465
Including ConAgra and Grants					
Treated Water	1.7166	1.3140	1.1928	1.1257	1.0637
Raw Water	0.5084	0.3137	0.2828	0.2653	0.2465

Key Inputs – Plant Purchase and Dam Construction

Starting Year	2004

Water Plant Capital

Milan Plant Purchase Capital Requirement	$3,564,500
Milan Plant Purchase Additional Capital	$482,200
Milan Plant Purchase Grant Funding	$1,214,000
Milan Plant Purchase Capital less Grants	$2,832,700

Supplemental Pipeline & Intake Capital Requirement	$1,136,000
Pipeline & Intake Grant Funding	$0
Pipeline & Intake Capital less Grants	$1,136,000

Interest Rate for Debt Financing	4.75%
Term of Project Financing - years	25

Phase 1 Capital

Investment Year	2005
Dam and Reservoir Construction Capital	$26,265,000
Dam Construction Grant Funding	$10,699,000
Dam Construction Capital less Grants	$15,566,000
Interest Rate for Debt Financing	5.00%
Term of Project Financing - years	25

Phase 2 Capital

Investment Year	2020
Dam and Reservoir Construction Capital	$32,450,000
Dam Construction Grant Funding	$0
Dam Construction Capital less Grants	$32,450,000
Interest Rate for Debt Financing	6.00%
Term of Project Financing - years	25

Plant O&M

Inflation Rate for Labor/Materials	4.0%
Inflation Rate for Energy	2.5%
Energy Unit Cost ($/kWh)	$0.0690
Average Monthly Energy Use (kWh)	55,000
Demand Charge ($/kW)	$206
Average Demand (kW)	8.50
Other Utility Costs (Gas?)	20,000
Plant Labor	$109,100
City Labor Offset (10%)	-$10,900
Routine Maintenance (1% of Plant Capital)	$35,600
Chemical Costs per Thousand Gallons	$0.275
General and Administration Expenses	$125,000
Lake Lease per Thousand Gallons	$0.150
Renewal & Replacement Fund Requirement	$20,000

Dam & Reservoir O&M

Phase 1	$40,000
Phase 2	$150,000

Water Usage

Milan Treated Water	0.350	[1]
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ConAgra Water Usage Growth	9.04%	
Other Treated Water Growth	5.00%	

Return

Return (% of O&M expense, Years 1-5)	5%
Return (% of O&M expense, Years10 and beyond)	10%

[1] 2002 Average MGD

Projected Water Costs
Plant Purchase and Dam Construction

	Years 1 - 5 $/1000 gal	Years 6 - 10 $/1000 gal	Years 11 - 15 $/1000 gal	Years 16 - 20 $/1000 gal	Years 21 -25 $/1000 gal
No ConAgra, No Grants					
Including Phase 1 & 2 Capital					
Treated Water	4.1091	3.3733	2.9800	4.6298	4.6944
Raw Water	2.1057	1.7779	1.5074	3.1655	3.2329
Including Grants, No ConAgra					
Including Phase 1 & 2 Capital					
Treated Water	3.8171	3.1771	2.8244	4.4940	4.5770
Raw Water	2.1057	1.7779	1.5074	3.1655	3.2329
Including ConAgra, No Grants					
Including Phase 1 & 2 Capital					
Treated Water	3.0822	2.4990	2.1032	3.0241	2.8022
Raw Water	1.6854	1.3739	1.1011	2.0933	1.9325
Including ConAgra and Grants					
Including Phase 1 & 2 Capital					
Treated Water	2.8935	2.3740	2.0112	2.9538	2.7497
Raw Water	1.6854	1.3739	1.1011	2.0933	1.9325

NEPA Process The Next Step

- Environmental Impact Study - Required With or Without Federal Funding Due to Likely Impacts
- Comprehensive Investigation of Possible Environmental, Social, and Cultural Resource Impacts
- Takes 12 to 15 Months to Complete!
- NRCS Leading Effort with Support From B&McD
- Costs for Dam and Reservoir - 100% NRCS
- Costs for Distribution System - 100% NCMRWC

After That?

- Permitting - Corps of Engineers, MO. Dept. of Natural Resources, Others
- Surveys & Final Geotechnical Investigations
- Construction Drawings & Specifications
- Land Acquisition - Must Own Land Before Construction Can Begin
- Time Frame - 12 Months Minimum
- Construction ? - Early 2006 (Best Case), Mid 2006 (More Likely)

Thank You

Questions?